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WITHIN A SOCIAL NETWORK



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Major Professor's Signature

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# A METHOD FOR IDENTIFYING INFLUENTIALS WITHIN A SOCIAL NETWORK

By

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ABSTRACT

A METHOD FOR IDENTIFYING INFLUENTIALS
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By

Michael Ryan Kotowski

Developing the ability to identify those responsible for enacting the majority of influence within a social network is an intriguing endeavor to social influence theorists and practitioners alike. One method of identification employs an argument that influentials possess a specific, quantifiable array of individual differences predisposing them to be superdiffusers of information. The three studies presented here refine the psychometric properties of a method of measuring the individual differences that may predispose some people to be particularly influential; and consequently efficient purveyors of change.

# ACKNOWLEDGEMENTS

The largest acknowledgement goes to my major professor, Dr. Franklin J. Boster. His continuing mentorship has been invaluable. Approximately three years ago I wrote in the acknowledgements of my master's thesis that Dr. Boster's standards and values have made an enormous positive impact on my intellectual and personal growth. It is three years later and not much has changed except for the size of the impact. One could not have asked for a better mentor (or somebody with a better collection of scotch).

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I am also fortunate to have several colleagues who have made completing this dissertation much more enjoyable. The Portuguese has been a wonderful conversational partner, always excited to engage in candid conversation on the current state of affairs. Trenchmouth has been an important collaborator even if the politics of his haircut are not consonant with the politics of his vote. Spicy has played the important role of reminding me that all work and no play makes Mike a dull boy, even if he does not always listen.

Finally, my entire family, especially Erin, deserves acknowledgement. It takes a special person to love somebody who is completing a doctoral degree. I am still grateful for the constant support and encouragement.

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# INTRODUCTION

Although the interpersonal influence generated by a mediated communication campaign is often seen as a design confound between intervention and comparison groups (Valente, 2001), when controlled by researchers, the effectiveness of campaigns that employ interpersonal influence has been demonstrated, particularly in grassroots campaigning (Salmon & Atkin, 2003). One reason for the effectiveness of campaigns utilizing interpersonal influence resides in the fact that an influence agent can exert influence adaptively, whereas the adaptive ability of a mediated message is limited. Even though both mediated and interpersonal influence agents can target specific populations, the interpersonal influence agent can more easily tailor appeals to the audience. More precise tailoring is advantageous from the perspective of the functional theory of attitudes (Katz, 1960; Shavitt, 1990) because as a message matches more closely the function served by an attitude, the likelihood of the desired persuasive outcome increases. The tailoring also results in messages addressing barriers to change at the individual level rather than at the group level. According to the health belief model (Rosenstock, 1974) this more precise attack on the target's perceived barriers (as well as other factors such as perceived severity and susceptibility) will result in a greater likelihood of influence. These positions are consistent with Chaffee (1982) who suggested that although traditional media campaigns are effective at disseminating information, interpersonal influence is necessary for change.

Employing interpersonal influence in persuasive campaigns is, however, not innovative. The potential for interpersonal influence has received substantial recognition from scholars, most notably in the two-step flow hypothesis (Katz, 1957; Katz &

Lazarsfeld, 1955) and Rogers' (1995) diffusion of innovations. The two-step flow hypothesis posits that mediated campaigns exert influence upon a small subgroup of opinion leaders that in turn exert influence upon the remainder in the social network. This idea has been refined in subsequent work (Granovetter, 1978; Valente, 1995) proposing that the common characteristic of the subgroup is their tendency to adopt change more quickly. Put differently, the subgroup possesses a lower threshold for influence than those composing the majority of the network.

Understanding two-step flow in terms of influence thresholds is also consistent with Rogers' (1995) diffusion of innovations model. According to the model, for any social network there is within group variability of people's thresholds for adopting an innovation (i.e., a new technology or idea). Rogers (1995) posits that people can be classified into the categories of innovators, early adopters, early majority, late majority, and laggards based on their threshold. Innovators and early adopters have the lowest thresholds for adoption and are analogous to the initial subgroup in the two-step flow hypothesis. Laggards on the other hand have the highest threshold for adoption and are consequently the last to adopt an innovation. According to Rogers (1995), because they are actively seeking new information a campaign exerts the most influence on the innovators and early adopters who, in turn, exert interpersonal influence on people in the remaining three categories.

Common to both the two-step flow hypothesis and the diffusion of innovations model are the persuasive effects that opinion leaders and innovators have on the remainder of the social network. In fact, evaluations of health campaigns employing the interpersonal influence of opinion leaders often reveal success (Celentano, Bond, Lyles,

Eiumtrakul, Go, Beyrer, Chiangmai, Nelson, Khamboonruang, & Vaddhanaphuti, 2000; Earp, Eng, O'Malley, Altpeter, Rauscher, Mayne, Matthews, Lynch, & Gaquish, 2002; Kelly, St. Lawrence, Stevenson, Hauth, Kalichman, Diaz, Brasfield, Koob, & Morgan, 1992; Miller, Klotz, & Eckholdt, 1998; Soumerai, McLauglin, Gurwitz, Guadagnoli, Hauptman, Borbas, Morris, McLaughlin, Gao, Willison, Asinger, & Gobel, 1998). Thus, it appears that the ability to identify opinion leaders within a social network is of particular value to the influence scholar and practitioner.

The question then becomes how does one identify opinion leaders so that their power of influence can be utilized to persuade others. Network analysis provides one possible solution (Durland & Fredericks, 2006; Valente, 1995). Network analysis is a technique used to map the pattern of relationships among actors in a group. By mapping the amount of communication between actors, network analysis can by used to identify possible opinion leaders by locating those with many communication links with others. A sociogram (Festinger, 1949; Moreno, 1934) is a map of the social network defining each individual as a node within a network of interconnected nodes where the connections represent lines of communication. By employing network analysis techniques, the density of communication between nodes can be quantified (Festinger, 1949; Scott, 2000). Through the examination of the density of communication within the network, it is possible to predict which actors will emerge as opinion leaders within the social network (Valente, 1995).

Network analysis is an expensive and time consuming method of identifying opinion leaders, particularly for large networks, because the methodology requires complex analyses to be carried out on a large number of observations to locate a small

number of opinion leaders. Rogers (1995) reports two more efficient techniques to identify opinion leaders. The first method involves asking actors to report who the leaders of the network are and the second method involves asking actors to report if they are a leader in the network. The validity of both methods, however, rests upon the ability and willingness of the respondent to report their own group status and the group status of others. The accuracy of these reports, however, can be suspect (Rogers, 1995). Consequently, as a potential solution to this problem, Rogers (1995) points out several demographic variables that could also be used to identify opinion leaders, such as higher exposure to the media than others in the network, extensive interpersonal relationships, high socioeconomic status, and a proclivity for innovativeness.

Although these demographic characteristics allow opinion leaders to be identified, they do not speak to the individual differences that explain why the opinion leader is an efficient purveyor of interpersonal influence. This fact is important for at least three reasons. First, if those responsible for diffusing the majority of information across a network are psychologically unique, the process of identifying them can be refined to a short psychographic inventory thus reducing the amount of resources necessary to locate them. Second, the same individual differences could be used to offer insight into the development of persuasive message strategies designed to influence people with those traits in the way Palmgreen, Donohew, Lorch, Hoyle, and Stephenson (2002) developed messages specifically tailored for high sensation seekers. Third, if these individual differences are motives for behavior, understanding them and the affiliated behaviors of the opinion leader can reveal ways to train people who do not have the traits to exhibit the behaviors. Therefore, based on the work of Gladwell (2002) and Boster,

Kotowski, and Andrews (2006), this series of studies seeks to develop further and refine a method of measuring the individual characteristics predisposing people to influence others effectively.

In a review of the literature across the disciplines of psychology, sociology, communication, and marketing, Gladwell (2002) suggested three individual difference characteristics – connector, salesman, and maven – that explain opinion leadership. According to Gladwell's (2002) conceptualization, a person need only exhibit one of the traits strongly to be an opinion leader. If a person exhibited a substantial amount of all three traits, however, not only would their ability to influence the network likely be greater, they would also be qualitatively different from an opinion leader. Such a person would be a superdiffuser, not only an early adopter of new information, but also a proactive disseminator of information across a diverse social network. Although the traits of connector, salesman, and maven are by no means the only important traits of the superdiffuser, they do provide an intuitive triumvirate of characteristics that one would naturally expect to be descriptive of an effective agent of influence – the well connected, person adaptive, knowledgeable persuader.

One of the classic investigations of the level of connectedness among people is the Travers and Milgram (1969; Milgram, 1977) study of the small world problem. This study found that information has a tendency to travel through a small handful of well connected people serving as common connections for the majority of the social network. Milgram and his colleagues randomly asked residents of a distant Midwestern city to forward a package to a stranger in Boston by passing the package through friends and acquaintances. In the end, three people accounted for 48% of the 64 packages that

eventually arrived at the target's address. Furthermore, the median number of intermediaries necessary to get a package from the Midwest to Boston was only 5.5. Granted, many of the packages never made it to Boston and the impact of these failed chains on the actual chain length had they not failed was not fully considered (e.g., Hunter & Shotland, 1974). Nevertheless, the small world problem provides an example of the variance in the level of connectedness that exists in social networks.

Based on the work of Gladwell (2002) it is thought that the connectors in the Travers and Milgram (1969) study were people who easily form close acquaintances with others. Furthermore, they were also likely good at maintaining those acquaintances once formed. It is possible however, to think of people who have lives rife with acquaintances who are not opinion leaders. This situation would most likely result when the acquaintances are all within group members. Although connectors do indeed form within group acquaintances, a more important prerequisite for a connector than the number of acquaintances is the number of acquaintances from different groups within the larger social network (Granovetter, 1973; 1982).

Weak-ties connect otherwise disconnected groups and consequently reduce the overall degree of homophily, or similarity, among people (Lazarsfeld & Merton, 1964). This reduction occurs because the more that people interact, the more that information is shared (Berger & Calabrese, 1975). As more information is shared, homophily within the group increases. Given that within group members are in more frequent contact with each other than with members of the larger social network, the level of within group homophily is higher than the level of homophily in the larger social network. As a result, there is a greater chance of exposure to unique information coming from a person outside

of the immediate social group than from within. Although connectors are within group members, they have exposure to the unique information coming from the larger social network because of their weak-tie relationships between groups. These weak-tie acquaintances increase the chance of unique information from one group being available to another group in the network. Hence, because of their tendency to form acquaintances not only within a group but across groups, connectors are pivotal players in the transfer of unique information across the entire social network.

Gladwell's (2002) explication of the salesman construct focuses on the subtle behavior that people may express when trying to persuade others with a particular focus on the ability to be emotionally expressive (Friedman, Prince, Riggio, & DiMatteo, 1980). Although emotional expressiveness may increase the level of emotional contagion, which increases similarity, which increases liking, which finally impacts persuasion, even if the model was correct and every path coefficient in the model equaled .70 the relationship between emotional expressiveness and persuasiveness would equal a correlation of .24. In other words, the link between Gladwell's (2002) conceptualization of the salesman and the intended outcome of persuasion are so far removed in the causal process that it is unlikely to be useful. Furthermore, salesmen make sales whether or not the customer has privately accepted (Festinger, 1953) the reason for complying, and short term compliance is not the goal of the opinion leader. The goal is attitude change and without private acceptance or the presence of the opinion leader to enforce compliance, prolonged behavior change is unlikely to result. Therefore, the second of Gladwell's (2002) opinion leader traits has been redefined into the persuader.

Effective opinion leaders are persuaders because of the ability to effectively search their message repertoire for a target adapted message (for a review, see O'Keefe, 2002). In other words, persuaders are skillful influencers of others in their social network. As an agent of influence, persuaders are able to generate highly accurate implicit theories of mind about the target. Persuaders also understand the implications of that implicit theory for persuasive message design. Thus, persuaders have superior person perception on some dimensions in a manner similar to high empathics (Davis, 1980) but persuaders utilize the accurate person perception to develop effective persuasive strategies for the specific influence target.

This notion of skill which is central to the persuader construct likely shares much variance, possibly converging over time, with a motivation to argue. That is, people who enjoy arguing are more likely to develop skill and people who have skill are more likely to enjoy arguing. Because of this relationship, persuaders are motivated to share information and try to convince others in the social network of the information's merit. Furthermore, persuaders are unlikely to concede a position of contention. Persuaders are not likely motivated due to dogmatism (Goldsmith & Goldsmith, 1980). If dogmatism were high, the persuader would have little information to share. Rather persuaders exert influence because of a need to share information for what is perceived to be the benefit of others. Accordingly, persuaders are proficient but fair debaters. Thus, persuaders are influentials within the social network not only because of persistent argument but also because that argument is tailored to the receiver.

The final construct of the influential triumvirate identified by Gladwell (2002) is the maven. Interest in mavens first surfaced in marketing because an understanding of

their characteristics could help market researchers understand marketplace consumption (Feick & Price, 1987). From the perspective of information diffusion, however, mavens are important because they find generating expertise in a content domain an exciting route to self-expression which is achieved through sharing the expertise with others that are perceived to be in need of information (Price, Feick, & Guskey, 1995). As a result of the information gathering involved in expertise generation, not only are mavens exposed to new information before others, but they are also adept at integrating new information into existing knowledge structures. Although Gladwell (2002) and Feick and Price (1987) define mavens as having broad expert knowledge, the more useful criterion for the purpose of identifying mavens for use in persuasive campaigns is expertise in a specific content area such as automobiles, sports, technology, or health.

This study considers the maven construct in the health context. The healthy lifestyle domain was chosen because its breadth is similar to that of the consumer products domain where much of the work on mavens has already been conducted. Specifically, the health domain is broader than cancer knowledge but narrower than the entirety of health knowledge. Healthy lifestyle mavens would have broad knowledge of healthy lifestyle topics, enjoy searching for new healthy lifestyle knowledge, enjoy sharing this knowledge with others who were perceived to be in need, and receive recognition by others as healthy lifestyle experts. A healthy lifestyle maven would be asked health-related questions often, and would serve as an information resource for others. Thus, healthy lifestyle mavens are opinion leaders because their evaluation and sharing of new information entering a social network is often the first heard by others.

Although Gladwell (2002) identified the constructs, a method of measuring the extent to which people possessed the three constructs with quantifiable estimates of reliability and validity was not developed until Boster et al. (2006) made an initial attempt that offered promising results. Across two independent samples Boster et al. (2006) tested the content validity of three measures. Each measure was composed of four Likert self-report items developed to form unidimensional measures of one of the connector, persuader, and healthy lifestyle maven constructs. Employing confirmatory factor analysis (CFA) the internal consistency and parallelism of each of the measures was found to exhibit substantial content validity in both samples. Furthermore, each measure had ample levels of reliability estimated by *Standardized Item* α (*S.I.*α) ≈ .84. Boster et al. (2006) also examined the convergent and divergent validity of the three measures within a nomological network (Cronbach & Meehl, 1955) of three additional constructs – social anxiety, argumentativeness, and value relevant involvement – and found results consistent with what would be expected given what the six measures were purported to measure (Table 1).

Table 1

*Boster et al. (2006) Nomological Network Correlations*

| | Connector | Persuader | Maven | Anxiety | Argue | Value |
|---|---|---|---|---|---|---|
| Connector | | | | | | |
| Persuader | 0.29 | | | | | |
| Maven | 0.16 | 0.23 | | | | |
| Anxiety | -0.55 | -0.20 | -0.10 | | | |
| Argue | 0.10 | 0.55 | 0.12 | -0.21 | | |
| Value | 0.03 | 0.10 | 0.51 | 0.11 | 0.02 | |

*Notes.* Maven = Healthy Lifestyle Maven, Anxiety = Social Anxiety, Argue = Argumentativeness, Value = Value-Relevant Involvement, n = 189, matrix contains correlations corrected for attenuation due to measurement error

Finally, Boster et al. (2006) quantified superdiffusers as people who scored at least one standard deviation above the mean on the connector, persuader, and healthy lifestyle maven measures simultaneously. According to this classification method approximately 2% of Boster et al.'s (2006) sample was classified as superdiffusers, which is consistent with what would be expected if superdiffusers are similar to the innovators of the diffusion of innovations literature (Rogers, 1995).

These studies build directly upon the findings of Boster et al. (2006) and offer refinements of those measures. First, although the Boster et al. (2006) data demonstrated that the items on the three measures were internally consistent and largely parallel across two independent samples, the small number of indicators resulted in some parallelism misfit between two of the measures. Therefore, although fewer items can be pragmatically superior, the studies reported subsequently increased the number of items on each of the three measures from four to ten in an attempt to find additional highly valid indicators of these constructs.

Another outcome of these additional items is that as long as the item reliabilities of the new items are at least equal to or greater than the means of the existing item reliabilities, the reliability estimates of the overall measures will increase. This increase occurs because the equivalence method of Cronbach's α (1951) ($\alpha$) defines reliability as the mean of all possible split-half coefficients. According to the formula for $\alpha$, as the sum of the item covariances increase relative to the sum of the item variances, $\alpha$ will increase. That fact, in conjunction with the fact that items which are alternate indicators of the same construct increase the sum of the item covariance faster than the sum of the item

variance, explains why the addition of alternate indicators of the same construct to a measure will increase $\alpha$.

Assuming that at least two of the new items for each measure will be discarded because of internal consistency and (or) parallelism issues, that the item reliabilities of the new items will be at least equal to the mean of the existing item reliabilities, and that the reliability estimates provided by Boster et al. (2006) will replicate, it is hypothesized that data collected with the revised measures will reveal that $S.I.\alpha \approx .93$ for the connector and maven measures and that $S.I.\alpha \approx .91$ for the persuader measure according to the Spearman-Brown prophecy formula (Nunnally & Bernstein, 1994).

This research also attempts to improve upon the developments of Boster et al. (2006) by modifying the method of scaling employed for the items composing each of the measures. In addition to increasing the number of items on the measure, the reliability of a measure can also be improved by increasing the range of item variances. The issue at hand is essentially a range restriction problem (Nunnally & Berstein, 1994). If item responses are not allowed to deviate from the mean item response because the range of the response scale is restrictive, the item covariances will also be restricted, and consequently the reliability of the measure will be attenuated. If, however, the range of the response scale is increased, to the extent that the entire scale is used by respondents, the item responses will be free to deviate to a greater extent from the mean item response. This deviation increase will in turn increase the item covariances and finally disattenuate the measure reliability.

One interesting technique to increase the range of the eight point categorical Likert response scale employed in Boster et al. (2006) is the method of direct magnitude

estimation (Meek, Sennott-Miller, & Ferketich, 1992; Stevens, 1956). The application of direct magnitude estimation to social phenomenon evolved from research in the area of psychophysics and involves presenting respondents with a single reference stimulus against which the respondents compare their possession of the attribute being assessed by the item. This comparison is accomplished by assigning the reference stimulus an arbitrary intensity value, typically 100 points. If respondents believe they possess twice as much of the attribute as the reference stimulus they are instructed to report 200 points. On the contrary, if they feel they possess only half as much of the attribute as the reference stimulus they are instructed to report 50 points. Respondents are further instructed to use the entire range of possible multiples when making comparisons against the reference stimulus.

Advocates of direct magnitude estimation argue that because respondents are not limited to a set number of response options as in categorical Likert scaling, the range of response variance is increased leading to improvements in overall measure reliability, among other psychometric benefits (e.g., Lodge, 1981). Research by Levine (1994), however, suggests that these benefits may only exist for responses that fall above the reference stimulus and that direct magnitude scaling is detrimental to the psychometric qualities of the measure for responses falling below the reference stimulus. Levine (1994) employed a repeated measures technique and compared responses to crime severity items made on a category scale versus a direct magnitude estimation scale where the magnitude estimations were collapsed into the category scale values. An examination of Levine's (1994) data reveals that only 11% of the crime severity ratings were in agreement across both types of scaling when the rating was below the value of the reference stimulus

whereas 52% of the ratings were in agreement when the rating was above the value of the reference stimulus. One description of this effect is that respondents have more difficulty quantifying the perceived level of an attribute relative to the reference stimulus when the perceived level is below the reference and less difficulty when the perceived level of the attribute is greater than the reference stimulus. This difficulty could result if respondents had greater difficulty with the fractional multiplication involved in estimations below the reference stimulus than with the whole number multiplication involved in estimations above the reference stimulus.

Silverman and Johnston (1975) present an elegant solution to this problem in the form of direct interval-estimation. Direct interval-estimation differs from direct magnitude estimation only in that respondents are given an interval anchored by low and high stimuli rather than a single reference stimulus. The stimulus representing the least amount of the attribute is assigned the lower value (e.g., zero) and the stimulus representing the greatest amount of the attribute is assigned the higher value (e.g., 100). Respondents are asked to consider the extent to which they possess the attribute in question, relative to the stimuli anchoring each end of the interval. That assessment is then quantified by the respondent as they report their location on the interval using the values assigned to both anchors as bounds. For example, a respondent believing that they possess a level of the attribute in the mid-point of the interval bounded by zero and 100 would report 50.

Silverman and Johnston (1975) reported data comparing the reliability of two groups of 15 novice coders of two tapes of esophageal speakers which differed only in the instructions given to the raters. One group was instructed to evaluate the quality of the

speaker using direct magnitude estimation scaling and the second group was instructed to evaluate the quality of the speaker using direct interval-estimation scaling. The data revealed that the direct interval-estimation ratings were substantially more reliable (*intra-class correlation coefficient* = .89) than the direct magnitude estimation ratings (*intra-class correlation coefficient* = .53). Thus, the direct interval-estimation solution is elegant not only because the method retains the variance maximizing benefits of direct magnitude estimation over categorical scaling formats, but it simultaneously eliminates the validity problems identified by Levine (1994). Consequently, it is hypothesized that direct interval-estimation scaling of item responses will result in greater reliabilities for the measures employed in this research than will categorical Likert scaling of item responses.

By extending the nomological network (Cronbach & Meehl, 1955) tested in Boster et al. (2006) to include measures of eight satellite constructs – social anxiety (Leary, 1983), need for affiliation (Edwards, 1959), argumentativeness (Infante & Rancer, 1982), perspective taking (Davis, 1983), value-relevant involvement (Cho & Boster, 2005), empathic concern (Davis, 1983), opinion leadership (Flynn, Goldsmith, & Eastman, 1996), healthy lifestyle activism (modified from Corning & Meyers, 2002 conventional social activism) – the present research also seeks to bolster the construct validity evidence produced by Boster et al. (2006). Cronbach and Meehl's (1955) approach involves hypothesizing a theoretically predicted nomological network among a set of constructs. This method demonstrates convergent validity and divergent validity through an a priori specification of how the measure under consideration correlates with other measures of theoretically related and unrelated constructs and subsequently comparing that specification to observed data. If the pattern of correlations matches

theoretical expectations then evidence is obtained consistent with construct validity. The larger network of eight constructs provides stronger construct validity evidence because random chance is less likely to produce a network of correlations consistent with theory.

Six of the satellite constructs were chosen so that, to the extent that the measures exhibit concurrent validity, the data produced by two of the satellite measures would correlate substantially with the data produced by the connector, persuader, or healthy lifestyle maven measures and the remaining four satellite measures would correlate to a lesser degree. Furthermore, the measures were chosen so that the satellite measures producing the two strong correlations would be unique for each of the connector, persuader, and healthy lifestyle maven measures.

Specifically, it is hypothesized that because connectors enjoy forming and maintaining acquaintances across groups, the connector construct will show a substantial negative correlation with social anxiety as measured by Leary's (1983) interaction anxiousness measure. Social anxiety is defined as a subjective aversion to social interactions. It is also hypothesized that the connector construct will have a substantial positive correlation with the need for affiliation as measured by the Edwards personal preference schedule (Edwards, 1959). Need for affiliation is defined as a motivation to draw near, cooperate with, and remain loyal to allied others. Finally, it is hypothesized that the connector construct will correlate to a lesser degree with argumentativeness, perspective taking, value-relevant involvement, and empathic concern because the desire to form connections with others is unlikely to be directly causally related to those constructs (see Figure 1).

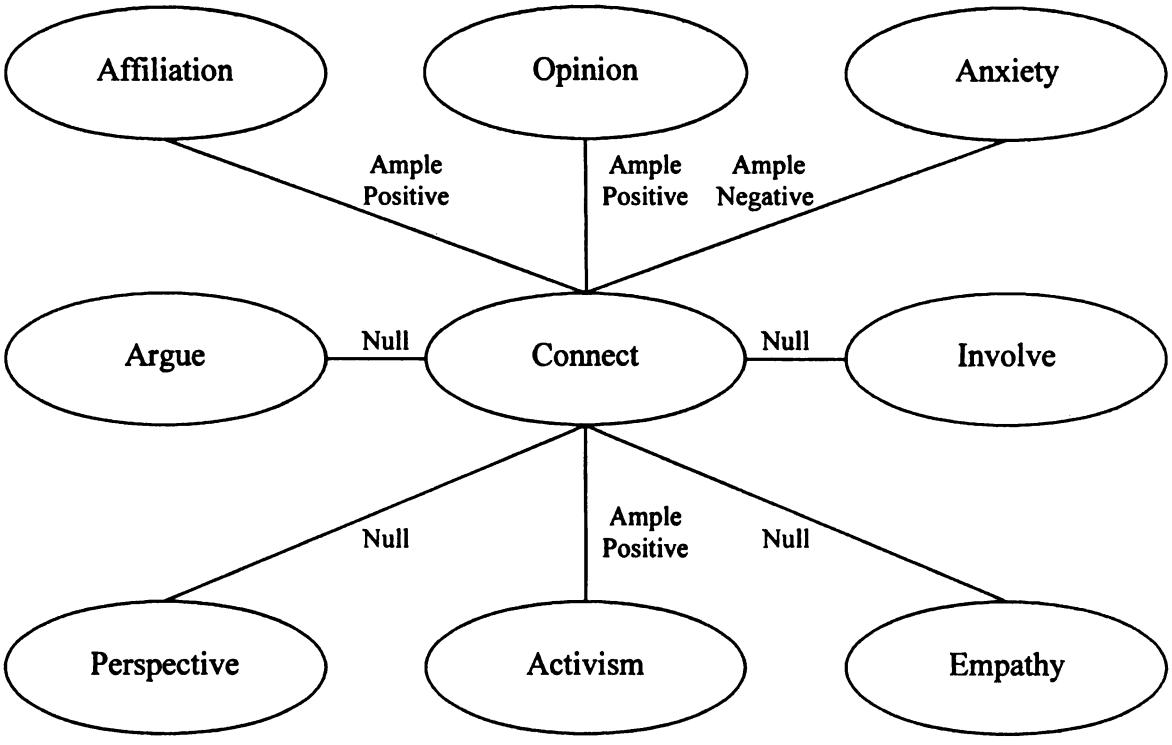


*Figure 1*. Hypothesized convergent and divergent validity nomological network for the connector construct.

*Notes*. Connect = Connector, Anxiety = Social Anxiety, Argue = Argumentativeness, Involve = Value-Relevant Involvement, Affiliation = Need for Affiliation, Perspective = Perspective Taking, Empathy = Empathic Concern, Opinion = Opinion Leadership, Activism = Healthy Lifestyle Activism

The persuader construct, or the extent to which a person is able to debate with and influence others adaptively, is hypothesized to have a substantial positive correlation with argumentativeness as measured by Infante and Rancer's (1982) argumentativeness measure. Argumentativeness is defined as the predisposition to advocate and defend positions on controversial issues while attacking other's stances on those issues. The persuader construct is also hypothesized to correlate positively with perspective taking as measured by Davis's (1983) perspective taking measure. Perspective taking is defined as the ability to adopt the psychological point of view of others. Social anxiety is expected to have a positive, albeit weaker, correlation with the persuader construct given that nervousness during social interaction likely makes it difficult to persuade effectively.

Because need for affiliation, value-relevant involvement, and empathic concern are not likely to have direct causal relationships with the persuader construct, the correlations between the persuader construct and those four variables are hypothesized to be weaker (see Figure 2).

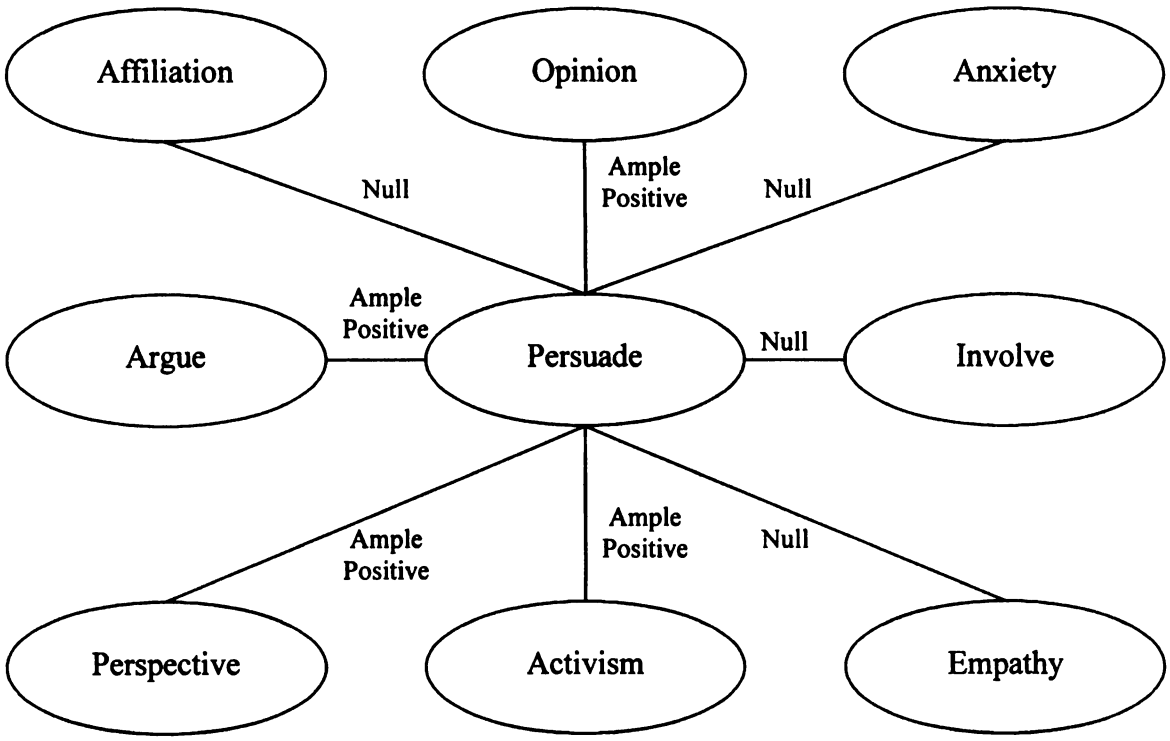


*Figure 2.* Hypothesized convergent and divergent validity nomological network for the persuader construct.

*Notes.* Persude = Persuader, Anxiety = Social Anxiety, Argue = Argumentativeness, Involve = Value-Relevant Involvement, Affiliation = Need for Affiliation, Perspective = Perspective Taking, Empathy = Empathic Concern, Opinion = Opinion Leadership, Activism = Healthy Lifestyle Activism

Given that the definition of the healthy lifestyle maven involves the motivation to develop expert healthy lifestyle knowledge along with the drive to share that information with others who may be in need, it is hypothesized that the maven construct will have an ample positive correlation with value-relevant involvement as measured by a modified version of Cho and Boster's (2005) value-relevant involvement measure. Value-relevant involvement is defined as a motivational state that links knowledge to the activation of

attitudes central to a person's values. The healthy lifestyle maven construct is also hypothesized to have an ample positive correlation with empathic concern as measured by Davis's (1983) empathic concern measure. Empathic concern is defined as the proclivity to experience feelings of sympathy and concern for others in need. Finally, the healthy lifestyle maven construct is hypothesized to correlate within sampling error of zero with social anxiety, need for affiliation, argumentativeness, and perspective taking because of the lack of direct causal relationships (see Figure 3).

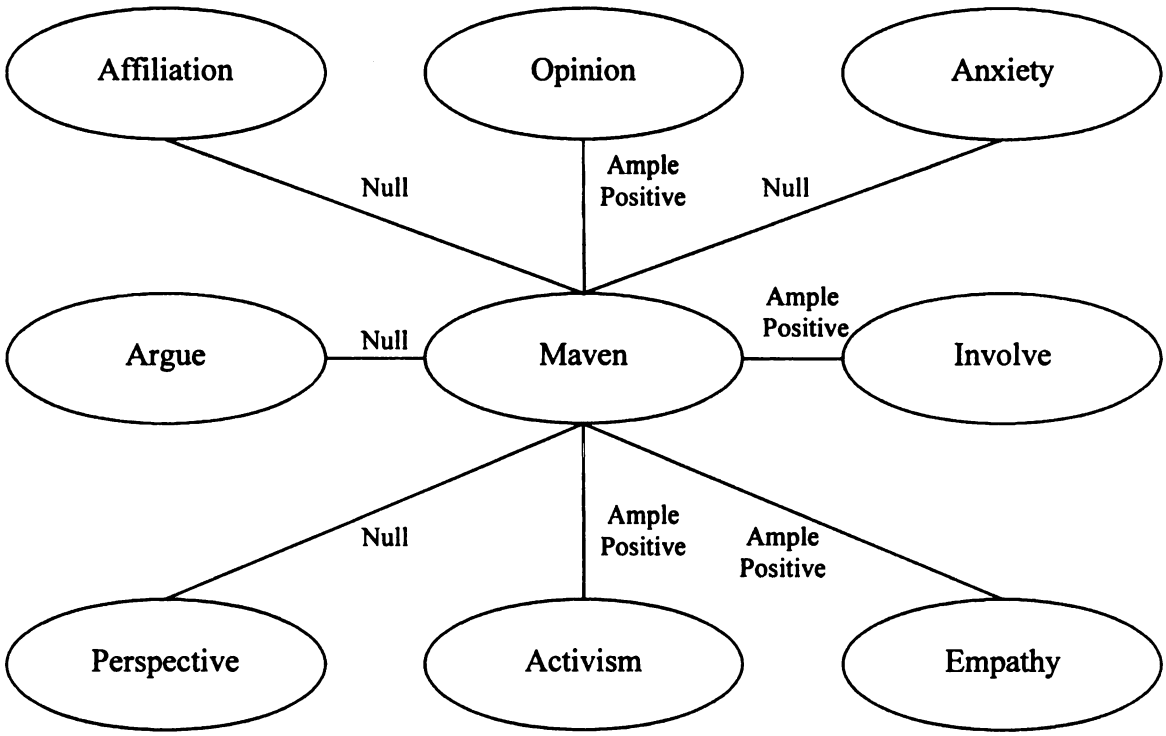


*Figure 3*. Hypothesized convergent and divergent validity nomological network for the healthy lifestyle maven construct.

*Notes*. Maven = Healthy Lifestyle Maven, Anxiety = Social Anxiety, Argue = Argumentativeness, Involve = Value-Relevant Involvement, Affiliation = Need for Affiliation, Perspective = Perspective Taking, Empathy = Empathic Concern, Opinion = Opinion Leadership, Activism = Healthy Lifestyle Activism

The remaining two satellite constructs were chosen so that the data produced by them would correlate substantially with the data from the connector, persuader, and healthy lifestyle maven measures. Particularly, it is hypothesized that because the traits of

connector, persuader, and healthy lifestyle maven are thought to predict the extent to which people are superdiffusers it is expected that they will also correlate substantially with other behaviors prototypical of influentials, particularly opinion leadership as measured by Flynn, Goldsmith, and Eastman's (1996) opinion leadership measure and healthy lifestyle activism as measured by a modified version of Corning and Myers' (2002) conventional activism orientation measure. Opinion leadership is defined as a predisposition to exert a disproportionate amount of influence on the decisions of others (Rogers & Cartano, 1962). Healthy lifestyle activism is defined as a trait-like predisposition to engage in low-risk behavior with the goal of advocating socially a healthy lifestyle. Because the connector, persuader, and healthy lifestyle maven constructs are conceptualized as unique components of the superdiffuser and not isomorphic with opinion leadership or healthy lifestyle activism it is hypothesized that the bivariate distributions between each of the three superdiffuser components and opinion leadership or healthy lifestyle activism will demonstrate heteroscedasticity. Specifically, the high end of the bivariate distribution will show more variance than the low end. This effect results from all non – connectors, persuaders, or healthy lifestyle mavens also not being opinion leaders or healthy life style activists, but not all connectors, persuaders, or healthy lifestyle mavens being opinion leaders or healthy life style activists.

In addition to refining the reliability of the connector, persuader, and healthy lifestyle maven measures and assessing their content and construct validity, there is also a need to test the extent to which the superdiffuser measures exhibit predictive validity. Predictive validity refers to the extent to which a measure predicts scores on a behavioral

criterion. Because connectedness in part refers to people's number of acquaintances, scores on the connector measure will correlate with the number of acquaintances people have to the extent that the connector measure has predictive validity. Furthermore, because persuasiveness is in part determined by argumentative adaptability, scores on the persuader measure will correlate with people's ability to formulate complex arguments to the extent that the persuader measure has predictive validity. Finally, because healthy lifestyle mavens are characterized in part by content domain expertise, scores on the healthy lifestyle maven measure will correlate with people's content domain knowledge to the extent that the maven measure has predictive validity.

This research tests these claims in three parts. In Study 1 the new connector, persuader, and healthy lifestyle maven items are combined with the Boster et al. (2006) items in order to assess the content validity and potential reliability improvements to the overall measures, that result from the inclusion of the new items. Study 1 also assesses the content validity of the need for affiliation (Edwards, 1959), perspective taking (Davis, 1983), empathic concern (Davis, 1983), opinion leadership (Flynn et al., 1996), and healthy lifestyle activism (Corning & Myers, 2002) measures. Study 1 does not examine the content validity of the original social anxiety (Leary, 1983), argumentativeness (Infante & Rancer 1982), and value-relevant involvement (Cho & Boster, 2005) measures because Boster et al. (2006) replicated content valid measurement models for those measures in two independent samples. Finally, because additional adjustments to the format of the connector, persuader, and healthy lifestyle maven measure will be made in Study 2, Study 1 refrains from examining their construct validity.

The ability of the content valid measurement models for the social anxiety, argumentativeness, and value-relevant involvement measures obtained in Boster et al. (2006) to replicate a third time will be assessed in Study 2. Study 2 also compares the categorical Likert scaling used by Boster et al. (2006) against direct interval-estimation scaling to determine if direct interval-estimation can improve the reliability of the measures as hypothesized. Furthermore, Study 2 examines the extent to which the nomological networks for the connector, persuader, and healthy lifestyle maven measures are consistent with theory as an indicator of the measure's construct validity.

Study 3 examines the predictive validity of the refined connector, persuader, and healthy lifestyle maven measures. The ability of the connector measure to predict the number of acquaintances people have is tested with a phone book test. The persuader measure's ability to predict people's argumentative complexity is tested with an argumentative skill interview. Finally, the healthy lifestyle maven measure's ability to predict content domain knowledge is tested with a healthy lifestyle knowledge test.

## STUDY 1

### *Method*

*Subjects.* Study 1 sampled 178 students enrolled in undergraduate Communication classes at a large Midwestern university. Of the 178 students sampled, 73% were females and 27% were males. On average, the sample was 20.65 ($s$ = 2.38) years old and 3.14 ($s$ = .73) years into their college career. When asked if they had ever held a leadership position, 85% responded yes. These students were compensated with course credit for their participation. Sampling was constrained to students at least 18 years old.

*Procedures.* Participation was solicited in a classroom setting immediately before starting. The researcher described Study 1 as, *"an examination of social opinion and social behavior involving the completion of a questionnaire containing 73 items that ask respondents to report the extent of their agreement with each item."* The researcher informed the students agreeing to participate (there were no students opting not to participate) that 45 minutes were allocated for the completion of the questionnaire. These subjects were also instructed to return their completed questionnaire to the researcher before leaving. At this point, the questionnaire was administered and a brief set of instructions regarding how to complete the items on the questionnaire was reviewed (Appendix A) before allowing the subjects to begin.

*Instrumentation.* In addition to a measure containing several demographic items (Appendix B), the questionnaire was composed of eight separate measures organized serially. The eight measures were designed to measure the constructs of connector, persuader, healthy lifestyle maven, need for affiliation, perspective taking, empathic concern, opinion leadership, and healthy lifestyle activism. The items on each measure

were a Likert format with eight point categorical response scales ranging from disagree strongly to agree strongly. The scales were coded to reflect that a response of agree strongly indicated that the respondent possessed more of the construct being measured than a response of disagree strongly. Thus, when coded, a higher number indicated more of the construct than a lower number. It is hypothesized that the items forming each measure fit unidimensional measurement models.

The connector construct was measured by a set of 10 items designed to reflect that connectors enjoy forming and maintaining relationships that serve as bridges between social groups and people who would not otherwise know one another. Items one through four in Appendix C were taken from an initial set of connector items written by Boster et al. (2006). In order to create a measure that embodies the construct more fully, items five through 10 were added to the connector measure.

The persuader construct was also measured by a set of 10 items (Appendix D). These items, however, were designed to measure the extent to which the respondent can influence people to adopt a particular position, employing techniques adapted to the specific situation if perceived to be necessary. Like the connector measure, items one through four were from Boster et al. (2006) and items five through 10 were developed to create a measure more representative of the persuader construct.

Similar to the connector and persuader constructs, the healthy lifestyle maven construct was assessed by a set of 10 items (Appendix E). The first four items were taken from Boster et al. (2006) and the remaining six were developed for this study to create a set of 10 items more representative of the construct than the original four. All 10 items

were created to measure the extent to which the respondent enjoys learning about an issue so that others can be helped by sharing the knowledge with those who are most in need.

Need for affiliation was measured by the nine manifest affiliation need items from the Edwards personal preference schedule (Edwards, 1959) (Appendix F). The items purport to measure an overt diffuse secondary need consistent with Murray's (1938) conceptualization that specifies a motivation to draw near, cooperate with, and remain loyal to allied others. This measure of affiliation has been shown to possess some degree of predictive validity (Kirchner, Dunnette, & Mousley, 1960) and reliability, $r_{test\text{-}retest}$ = .77, (Mann, 1958). The Edwards personal preference schedule (Edwards, 1959), however, is an ipsative measure of forced choice comparisons between items measuring competing needs. For the sake of scaling consistency with the other measures in the pretest, each of the items was presented in a Likert format.

Davis' (1980) interpersonal reactivity index was applied to measure the construct of perspective taking. The construct was measured by the seven item perspective taking component of the index (Appendix G). The items on this measure focus on the respondent's ability to adopt the psychological point of view of others. Davis (1983) demonstrated the construct validity of this measure showing that it correlates modestly with other measures of interpersonal reactivity. This perspective taking measure also has been shown to be reliable, $\alpha \approx .74$ (Davis, 1983).

The interpersonal reactivity index (Davis, 1980) was also employed to measure empathic concern. The seven item empathic concern component of the measure was used for this purpose (Appendix H). These seven items were designed to measure the tendency for the respondent to experience feelings of sympathy and concern for others in need. The

construct validity of this measure has been shown in that scores correlate with measures of concern for others (Davis, 1983). The measure also has also been shown to be reliable, $\alpha \approx .74$ (Davis, 1983).

The six item Flynn et al. (1996) opinion leadership measure (Appendix I) was used to measure opinion leadership in the form of a tendency to exert a disproportionate amount of influence on the decisions of others. Flynn et al. (1996) demonstrated the predictive validity of this measure by correlating it with a series of information seeking and sharing behaviors. This previous research also found the reliability of the measure to be, $\alpha = .78$ (Flynn et al., 1996).

The healthy lifestyle activism measure (Appendix J) was a modified version of the conventional activism orientation measure (Corning & Myers, 2002). The items on the original measure were designed to measure political activism. The original politically focused measure was found to be largely construct valid, in that it correlated with other measures of political activism, and have a reliability estimated by $\alpha$ to be .96 (Corning & Meyers, 2002). The political focus of the items was changed, however, to a healthy lifestyle focus by replacing references to politics with references to a healthy lifestyle. The modified measure was employed to measure the anticipated tendency to engage in a low-risk form of healthy lifestyle activism at a point in the future. The construct was measured with a set of 10 healthy lifestyle activism items randomly selected from a larger set of 28 activism items on the Corning and Myers (2002) measure.

*Results*

Preliminary review of the eight factor inter-item correlation matrix revealed several items that failed to exhibit internal consistency, parallelism, or both (Hunter &

Gerbing, 1982). Those items were discarded and the measurement model was subjected to testing with CFA. The CFA method applied in this study to test measurement models calculated factor loadings with a centroid estimation procedure using communalities on the diagonal (Hunter & Hamilton, 1992). Factor loadings and model specifications were used to generate a predicted inter-item correlation matrix which was subtracted from the observed inter-item correlation matrix. The resultant residual matrix was examined to assess model fit. To the extent that the residuals in the matrix were within sampling error of zero, the model was said to exhibit fit with the data. This process revealed several more items exhibiting gross misfit. These items were also removed from the analyses and an eight factor measurement model consistent with the data was achieved.[1] Table 2 presents the factor loadings and factor correlation matrix for the model.

Evidence generated by the analyses demonstrated that the eight factor model fit the data well. For example, all factor loadings were ample, with no item possessing a factor loading less than .51. Additionally, this model's residual matrix was composed of 841 numbers which could produce 43 statistically significant residuals by chance when $p < .05$. The actual number of residuals for the model not within sampling error of zero was 23, with the largest at .29. Finally, the average residual in the matrix was well within sampling error of zero, *Root Mean Square Error* (*RMSE*) = .07. Focused examination of the nested three factor connector, persuader, and healthy lifestyle maven measurement

[1] It is worth noting that some have argued against modifying a measure by removing or adding items, under the premise that it destroys the measure's integrity. That argument, however, is unfounded because it in part assumes that the items contained within the measure are the only items that could possibly measure the construct in question. The argument also assumes that the items in the measure are more optimal or representative of the construct being measured than the infinite remainder of items not contained within the measure. Although these assumptions are more tenable for precisely defined constructs with precisely developed measures, this is not the case for the majority of social scientific measurement. Therefore, in the face of empirical evidence suggesting some items do not measure what they purport to measure, the modification of existing measures by removing items displaying evidence of invalidity is warranted.

model revealed that the newly included items resolved the parallelism concerns observed between the connector and persuader measures observed in the Boster et al. (2006) study. Only two residuals across the three factor model were not within sampling error of zero, with the largest being .22 (four could be expected due to chance), *RMSE* = .09.

Table 2

*Study 1 Factor Loadings and Factor Correlation Matrix*

| Item | Con | Per | Mav | Aff | Persp | Emp | Opin | Act |
|---|---|---|---|---|---|---|---|---|
| Connector 1 | 0.62 | 0.28 | 0.12 | 0.32 | 0.15 | 0.13 | 0.06 | 0.06 |
| Connector 2 | 0.78 | 0.19 | 0.14 | 0.22 | 0.06 | 0.03 | 0.17 | 0.07 |
| Connector 3 | 0.85 | 0.26 | 0.17 | 0.30 | 0.20 | 0.14 | 0.13 | 0.08 |
| Connector 4 | 0.70 | 0.22 | 0.20 | 0.28 | 0.24 | 0.12 | 0.16 | 0.14 |
| Connector 6 | 0.77 | 0.14 | 0.20 | 0.18 | 0.08 | -0.03 | 0.15 | 0.09 |
| Connector 9 | 0.66 | 0.22 | 0.19 | 0.19 | 0.17 | 0.01 | 0.17 | 0.09 |
| Persuader 1 | 0.23 | 0.72 | 0.18 | 0.15 | 0.10 | 0.04 | 0.12 | -0.03 |
| Persuader 3 | 0.23 | 0.81 | 0.14 | 0.16 | 0.03 | 0.03 | 0.14 | -0.01 |
| Persuader 4 | 0.31 | 0.79 | 0.22 | 0.22 | 0.13 | 0.11 | 0.10 | 0.01 |
| Persuader 5 | 0.15 | 0.86 | 0.18 | 0.13 | 0.16 | 0.10 | 0.05 | -0.05 |
| Persuader 6 | 0.14 | 0.76 | 0.12 | 0.26 | 0.12 | 0.04 | 0.00 | 0.00 |
| Persuader 7 | 0.22 | 0.81 | 0.13 | 0.18 | 0.12 | 0.06 | 0.06 | -0.01 |
| Persuader 9 | 0.21 | 0.76 | 0.28 | 0.19 | 0.15 | 0.08 | 0.17 | 0.07 |
| Persuader 10 | 0.38 | 0.71 | 0.23 | 0.28 | 0.20 | 0.09 | 0.06 | 0.02 |
| Maven 2 | 0.18 | 0.20 | 0.87 | 0.21 | 0.25 | 0.07 | 0.66 | 0.37 |
| Maven 4 | 0.14 | 0.21 | 0.87 | 0.14 | 0.22 | 0.10 | 0.79 | 0.44 |
| Maven 5 | 0.27 | 0.26 | 0.77 | 0.24 | 0.27 | 0.15 | 0.55 | 0.39 |
| Maven 6 | 0.21 | 0.23 | 0.86 | 0.06 | 0.20 | 0.11 | 0.66 | 0.50 |
| Maven 8 | 0.14 | 0.18 | 0.83 | 0.24 | 0.29 | 0.07 | 0.62 | 0.43 |
| Maven 9 | 0.24 | 0.20 | 0.85 | 0.25 | 0.33 | 0.17 | 0.67 | 0.55 |
| Maven 10 | 0.20 | 0.12 | 0.82 | 0.22 | 0.25 | 0.08 | 0.78 | 0.52 |
| Affiliation 2 | 0.26 | 0.17 | 0.15 | 0.86 | 0.35 | 0.48 | 0.07 | 0.11 |
| Affiliation 3 | 0.31 | 0.17 | 0.20 | 0.68 | 0.32 | 0.48 | 0.13 | 0.14 |
| Affiliation 6 | 0.26 | 0.13 | 0.14 | 0.56 | 0.35 | 0.38 | 0.08 | 0.13 |
| Affiliation 8 | 0.06 | 0.18 | 0.13 | 0.53 | 0.43 | 0.33 | 0.09 | 0.11 |

Table 2 (cont'd)

| Item | Con | Per | Mav | Aff | Persp | Emp | Opin | Act |
|---|---|---|---|---|---|---|---|---|
| Perspective 1 | 0.24 | 0.10 | 0.21 | 0.43 | 0.72 | 0.45 | 0.13 | 0.24 |
| Perspective 3 | 0.06 | 0.11 | 0.23 | 0.47 | 0.69 | 0.54 | 0.15 | 0.32 |
| Perspective 6 | 0.18 | 0.20 | 0.12 | 0.34 | 0.53 | 0.24 | 0.11 | 0.07 |
| Perspective 7 | 0.05 | 0.00 | 0.21 | 0.15 | 0.60 | 0.32 | 0.17 | 0.29 |
| Empathic 3 | 0.07 | 0.09 | 0.08 | 0.37 | 0.45 | 0.65 | 0.05 | 0.18 |
| Empathic 4 | 0.14 | 0.10 | 0.15 | 0.55 | 0.51 | 0.81 | 0.11 | 0.23 |
| Empathic 6 | 0.00 | 0.00 | -0.09 | 0.30 | 0.31 | 0.55 | -0.06 | 0.19 |
| Empathic 7 | 0.03 | 0.04 | 0.19 | 0.45 | 0.34 | 0.62 | 0.20 | 0.33 |
| Opinion 3 | 0.06 | -0.04 | 0.63 | 0.12 | 0.18 | 0.26 | 0.52 | 0.40 |
| Opinion 4 | 0.20 | 0.15 | 0.64 | 0.12 | 0.23 | 0.03 | 0.83 | 0.42 |
| Opinion 5 | 0.11 | 0.09 | 0.57 | 0.12 | 0.13 | 0.04 | 0.82 | 0.43 |
| Opinion 6 | 0.22 | 0.14 | 0.65 | 0.07 | 0.12 | 0.02 | 0.91 | 0.46 |
| Activism 2 | 0.03 | -0.01 | 0.50 | 0.12 | 0.29 | 0.27 | 0.54 | 0.79 |
| Activism 3 | 0.07 | 0.05 | 0.45 | 0.13 | 0.29 | 0.33 | 0.45 | 0.78 |
| Activism 4 | 0.19 | 0.00 | 0.44 | 0.17 | 0.30 | 0.32 | 0.45 | 0.84 |
| Activism 5 | 0.11 | 0.04 | 0.30 | 0.15 | 0.26 | 0.24 | 0.30 | 0.66 |
| Activism 6 | 0.08 | -0.07 | 0.45 | 0.16 | 0.29 | 0.24 | 0.44 | 0.87 |

| Factor | | | | | | | |
|---|---|---|---|---|---|---|---|
| Connector | | | | | | | |
| Persuader | 0.30 | | | | | | |
| Maven | 0.24 | 0.24 | | | | | |
| Affiliation | 0.34 | 0.25 | 0.23 | | | | |
| Perspective | 0.21 | 0.16 | 0.31 | 0.55 | | | |
| Empathic | 0.09 | 0.09 | 0.13 | 0.64 | 0.61 | | |
| Opinion | 0.19 | 0.11 | 0.81 | 0.14 | 0.22 | 0.11 | |
| Activism | 0.12 | 0.00 | 0.54 | 0.19 | 0.36 | 0.35 | 0.56 |

*Notes*. Con = Connector, Per = Persuader, Mav = Healthy Lifestyle Maven, Aff = Need for Affiliation, Persp = Perspective Taking, Emp = Empathic Concern, Opin = Opinion Leadership, Act = Healthy Lifestyle Activism, n = 178

Consequently, the eight sets of items, each with substantial evidence of content validity were formed into eight indices by calculating the mean response across each set of items. The connector index (connector items: 1, 2, 3, 4, 6, and 9) ranged from 1.33 to

8.00 and was distributed with a slight negative skew and slightly leptokurtic, $M = 6.04$, $s = 1.10$, $\alpha = .87$, *Standardized Item* $\alpha$ (*S.I.* $\alpha$) = .87. Scores on the persuader index (persuader items: 1, 3, 4, 5, 6, 7, 9, and 10) ranged from 1.88 to 8.00. The mean of the persuader distribution was 5.85 ($s = 1.10$), $\alpha = .92$, and *S.I.* $\alpha = .92$. There was a slight negative skew to the distribution; it was also slightly leptokurtic. The distribution of the healthy lifestyle maven index (maven items: 2, 4, 5, 6, 8, 9, and 10), ranging from 1.29 to 8.00, was normal, $M = 5.00$, $s = 1.57$. The reliability, estimated by $\alpha = .94$ and *S.I.* $\alpha = .94$. The distribution of the need for affiliation index (need for affiliation items: 2, 3, 6, and 8) was negatively skewed and leptokurtic (Range = 4.00 – 8.00), $M = 7.14$, $s = .74$, $\alpha = .72$, *S.I.* $\alpha = .75$. Responses on the perspective taking index (perspective taking items: 1, 3, 6, and 7), ranged from 1.50 to 8.00, and were distributed leptokurticly, $M = 5.80$, $s = 1.07$, $\alpha = .73$, *S.I.* $\alpha = .73$. The empathic concern index (empathic concern items: 3, 4, 6, and 7) was approximately normally distributed and ranged from 3.25 to 8.00. The indices mean response was 6.35 ($s = 1.02$), $\alpha = .74$, *S.I.* $\alpha = .75$. Scores on the opinion leader index (opinion leader items: 3, 4, 5, and 6) also approximated normality, ranging from 1.25 to 8.00. The opinion leader distribution had a mean of 4.32 ($s = 1.43$). The reliability, estimated by $\alpha = .85$ and *S.I.* $\alpha = .85$. Finally, the healthy lifestyle activism index (activism items: 2, 3, 4, 5, and 6) also approached a normal distribution (Range = 1.00 – 8.00), $M = 3.86$, $s = 1.56$, $\alpha = .89$, *S.I.* $\alpha = .89$. Table 3 presents a summary of the indices' descriptives.

There were no substantial relationships between respondent sex and scores on the connector, persuader, or healthy lifestyle maven measures. All three relationships were within sampling error of zero. The same finding was observed for respondent age and

year in school. The relationship between whether the respondent reported holding a position of leadership and the connector measure ($r$ = .31, *r Corrected for Attenuation due to Measurement Error* ($r'$) = .33) was not within sampling error of zero, however. A similar relationship was observed between whether the respondent reported holding a position of leadership and the persuader measure ($r$ = .16, $r'$ = .17). Given the definitions of the connector and persuader constructs, however, it is not surprising that they share a relationship with leadership.

Table 3

*Study 1 Measure Descriptives*

| Measure | *M* | *s* | *Min - Max* | *α* | *S.I. α* | *Skewness* | *Kurtosis* |
|---|---|---|---|---|---|---|---|
| Connector | 6.04 | 1.10 | 1.33 - 8.00 | 0.87 | 0.87 | -0.97 | 1.84 |
| Persuader | 5.85 | 1.10 | 1.88 - 8.00 | 0.92 | 0.92 | -0.87 | 1.10 |
| Maven | 5.00 | 1.57 | 1.29 - 8.00 | 0.94 | 0.94 | -0.04 | -0.69 |
| Affiliation | 7.14 | 0.74 | 4.00 - 8.00 | 0.72 | 0.75 | -1.31 | 2.10 |
| Perspective | 5.80 | 1.07 | 1.50 - 8.00 | 0.73 | 0.73 | -0.56 | 1.13 |
| Empathic | 6.35 | 1.02 | 3.25 - 8.00 | 0.74 | 0.75 | -0.52 | -0.08 |
| Opinion | 4.32 | 1.43 | 1.25 - 8.00 | 0.85 | 0.85 | -0.13 | -0.51 |
| Activism | 3.86 | 1.56 | 1.00 - 8.00 | 0.89 | 0.89 | 0.05 | -0.84 |

*Notes*. Maven = Healthy Lifestyle Maven, Affiliation = Need for Affiliation, Perspective = Perspective Taking, Empathic = Empathic Concern, Opinion = Opinion Leadership, Activism = Healthy Lifestyle Activism n = 178

By applying Boster et al.'s (2006) quantification of superdiffusers as people with responses at least one standard deviation above the mean on the connector, persuader, and healthy lifestyle maven measures, 1.7% of this study's sample were classified as superdiffusers. Interestingly, 15% of the sample was one standard deviation above the mean on the opinion leader measure and 17% on the activist measure when applying the same criteria to the opinion leader or healthy lifestyle activism measures. Although not sufficient evidence, these differential percentages are consistent with the hypothesis that

the superdiffuser is indeed an entity distinct from opinion leaders and activists. Although the bivariate scatterplots presented in Figures 4 and 5 show data inconsistent with the heteroscedasticity hypothesis presented earlier, the plots did provide further evidence consistent with the conclusion that superdiffusers are conceptually distinct from opinion leaders and activists. That is, each superdiffuser measure displayed unique relationships with the opinion leader measure and the activism measure.

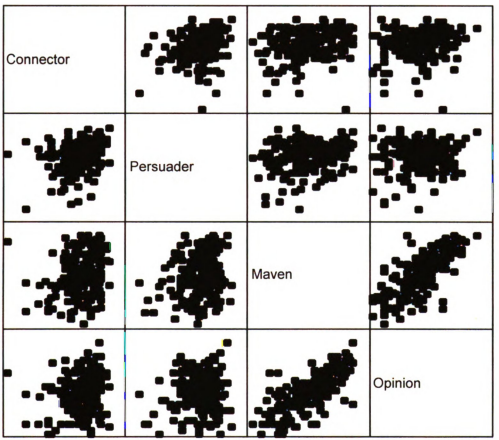


*Figure 4.* Opinion leadership by superdiffuser scatterplot matrix.

*Notes.* Maven = Healthy Lifestyle Maven, Opinion = Opinion Leadership, n = 178

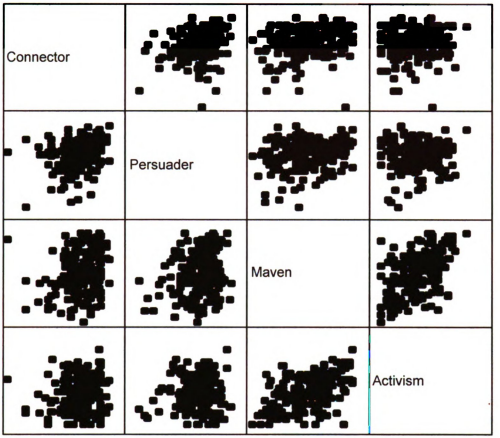


*Figure 5.* Healthy lifestyle activism by superdiffuser scatterplot matrix.

*Notes.* Maven = Healthy Lifestyle Maven, Activism = Healthy Lifestyle Activism, n = 178

Examining these relationships in more detail produced an even more interesting finding. Specifically, only the healthy lifestyle maven index appears to be associated strongly with opinion leadership and healthy lifestyle activism. The multiple regression analysis regressing opinion leadership onto the connector, persuader, and healthy lifestyle maven measures as well as all two-way and three-way interactions found only the healthy lifestyle maven construct as a substantial and statistically significant predictor. For example, the standardized regression coefficient for the connector measure was $\beta = .03$ ($t$ (170) = 0.58, *ns*, $\beta$ *Corrected for Attenuation due to Measurement Error* ($\beta'$) = .04), for the persuader measure was $\beta = -.10$ ($t$ (170) = -1.67, *ns*, $\beta' = -.13$), and for the healthy

lifestyle maven measure was $\beta = .74$ ($t$ (170) = 13.48, $p < .05$, $\beta' = .84$). A similar effect was observed when healthy lifestyle activism scores were regressed onto the connector, persuader, and healthy lifestyle maven indices, as well as all two-way and three-way interaction terms. Once again, the healthy lifestyle maven measure emerged as the only substantial predictor ($\beta = .52$, $t$ (170) = 7.72, $p < .05$, $\beta' = .59$). Table 4 presents the regression models.

Table 4

*Study 1 Regression Models*

| Model | Component | *B* | se | *β* | *t* | sig | *B'* |
|---|---|---|---|---|---|---|---|
| Opinion Leadership | Constant | 4.33 | 0.08 | | 55.07 | $p < .05$ | |
| $F$ (7, 170) = 28.79 | C | 0.00 | 0.07 | 0.03 | 0.58 | ns | 0.04 |
| $p < .05$ | P | -0.13 | 0.08 | -0.10 | -1.67 | ns | -0.13 |
| $R_{adj} = .72$ | M | 0.68 | 0.05 | 0.74 | 13.48 | $p < .05$ | 0.84 |
| | C x P | -0.02 | 0.06 | -0.02 | -0.31 | ns | -0.03 |
| | C x M | 0.00 | 0.04 | 0.00 | 0.06 | ns | -0.01 |
| | P x M | -0.03 | 0.04 | -0.04 | -0.72 | ns | -0.05 |
| | C x P x M | 0.03 | 0.05 | 0.04 | 0.61 | ns | 0.04 |
| Activism | Constant | 3.89 | 0.11 | | 36.70 | $p < .05$ | |
| $F$ (7, 170) = 10.63 | C | 0.05 | 0.10 | 0.03 | 0.48 | ns | 0.05 |
| $p < .05$ | P | -0.27 | 0.10 | -0.19 | -2.59 | $p < .05$ | -0.23 |
| $R_{adj} = .53$ | M | 0.52 | 0.07 | 0.52 | 7.72 | $p < .05$ | 0.59 |
| | C x P | -0.07 | 0.08 | -0.07 | -0.91 | ns | -0.08 |
| | C x M | 0.00 | 0.06 | 0.00 | 0.00 | ns | 0.01 |
| | P x M | 0.04 | 0.06 | -0.05 | -0.73 | ns | -0.06 |
| | C x P x M | 0.12 | 0.06 | 0.15 | 1.86 | ns | 0.15 |

*Notes.* C = Connector, P= Persuader, M = Healthy Lifestyle Maven, components are mean centered to reduce multicollinearity, n = 178

*Discussion*

The results demonstrate the presence of three internally consistent and parallel sets of indicators, composed of items from the original measure development of Boster et al. (2006) as well as new items, purported to measure the focal constructs of the

superdiffuser: connector, persuader, and healthy lifestyle maven. The measure improvements increased the mean level of reliability across the three measures from *S.I.* $\alpha = .84$, as observed in the original measure development studies, to *S.I.* $\alpha = .91$.

The reliability of the connector measure was, however, lower than the Spearman-Brown estimate. Even so, the new items caused the reliability to improve relative to the reliability estimates obtained in the two studies of Boster et al. (2006). This discrepancy between the observed increase and the Spearman-Brown predicted increase was due to the fact that, on average, the new items were weaker indicators of the connector construct than the original items.

The increases for the other measures all approximated the Spearman-Brown prophecy formula estimates. It is also worth noting that the response distributions for each of the measures moved towards normality relative to the distributions observed in Boster et al. (2006). Given this set of findings, it is reasonable to conclude that the new items generally improved the psychometric qualities of the connector, persuader, and healthy lifestyle maven measures.

The CFAs performed on the Study 1 data also allowed for improvements to the need for affiliation, perspective taking, empathic concern, opinion leadership, and healthy lifestyle activism measures by assisting in the identification and removal of items displaying content invalidity. Although the improvements did not result in optimal measures of all constructs[2], the refinement of the measures resulted in a considerable

[2] The perspective taking and empathic concern measures contained items with disproportionate numbers of statistically significant residuals, indicative that these two measures were less content valid than the other measures. Although the accumulating residuals gives some reason for concern, because *RMSE* for the most severely affected matrices was not extremely poor (perspective taking by need for affiliation *RMSE* = .10 and empathic concern by opinion leadership *RMSE* = .11) and the quality of measurement for these two measures was not a primary focus of the study, the measures were considered acceptable.

reduction in the amount of measurement error present in the assessment of each construct. Consequently, these refined measures will be employed in Study 2 because the reduced measurement error improves the accuracy of estimating the correlations among the constructs; an important consideration for the nomological network approach to assessing construct validity.

Study 1 also revealed two findings that will be considered further in Study 2. First, 1.7% of the subjects in Study 1 were classified as superdiffusers according to their responses on the connector, persuader, and healthy lifestyle maven measures. Interestingly, 1.7% of the subjects assessed in the two studies of Boster et al. (2006) were superdiffusers. Based on these data it is expected that 1.7% of the subjects in Study 2's sample will also be superdiffusers.

The second finding that will be considered further in Study 2 is the uniqueness of the superdiffuser from traditional conceptualizations of opinion leader or activist. Put differently, the regression analyses conducted in Study 1 revealed that opinion leadership and activism are not accounted for by the connector and persuader constructs. This effect is consistent with traditional conceptualizations of opinion leadership and activism which focus on tendencies to have expertise about new ideas or products, without mentioning characteristics of connectedness or persuasiveness. What is more, although these tendencies appear akin to the healthy lifestyle maven in nature and the healthy lifestyle maven construct correlates substantially with opinion leadership and activism, the measurement model assessment and factor correlations from Study 1 indicate that the healthy lifestyle maven construct is not isomorphic with opinion leadership and activism. The data from Study 2 will be examined to assess the stability of this finding.

In addition to exploring these issues, Study 2 will examine two main hypotheses. First, Study 2 offers a comparison between the Likert scaling, employed up until this point in the development of the superdiffuser measures, and direct interval-estimation scaling. It is predicted that direct interval-estimation will offer improvements to the measures' reliabilities because of the possibility for increased inter-item variance and hence increased inter-item response covariance relative to Likert scaling. Study 2 also examines the content validity of the measures in detail by examining the hypothesized nomological networks for the connector, persuader, and maven measures presented in Figures 1, 2, and 3. According to the method, the extent that the pattern of observed correlations matches the pattern of hypothesized expectations is evidence consistent with construct validity (Cronbach & Meehl, 1955).

## STUDY 2

### *Method*

*Subjects.* The sample for this study consisted of 300 undergraduate students from a large Midwestern university who were on average 19.93 ($s$ = 1.50) years old and had spent 2.64 ($s$ = 1.23) years in college. Additionally, the sample was 62% female and 38% male. When asked if they had held a position of leadership since beginning college, 49% indicated yes. The students were enrolled in undergraduate Communication classes and received course credit in exchange for their participation. Sampling was constrained to students at least 18 years old who had not participated in Study 1.

*Design.* One of the goals for Study 2 was to examine the effects that response scaling can have on the reliability, content validity, and construct validity of a measure. Specifically, a categorical Likert scaling format was compared against a direct interval-estimation method. Therefore, employing random assignment, 150 subjects responded to items that were scaled categorically and 150 subjects responded to items scaled with direct interval-estimation. Demographic differences between the subjects in each condition were within sampling error of zero for sex and having been in a leadership position. Subjects in the two conditions did, however, differ on two demographic variables. Subjects in the Likert condition were older ($M$ = 20.40, $s$ = 1.55) than subjects in the interval-estimation condition ($M$ = 19.46, $s$ = 1.29), $t$ (298) = 5.71, $p < .05$, $r$ = .32, and subjects in the Likert condition had spent more time in college ($M$ = 2.97, $s$ = 1.19) than subjects in the interval-estimation condition ($M$ = 2.31, $s$ = 1.18), $t$ (298) = 4.89, $p <$ .05, $r$ = .26. Because there are no major life-events that occur systematically between 19.46 years old and 20.40 years old or between the 2.31 year of college and the 2.97 year

of college it is unlikely that these differences, although statistically significant, are substantively important.

*Procedures*. Students were solicited for participation via a departmental subject pool that enabled students enrolled in any of several undergraduate courses to participate. The study was described as, *"an examination of social opinion and social behavior involving the completion of a questionnaire containing 64 items that ask respondents to report their evaluation of each item."* Students choosing to participate in the study after reading the description were given an appointment time and a location at which to meet. Approximately 25 subjects participated at each appointment time. At each time, a researcher welcomed the subjects before instructing them to have a seat in one of the desks that filled the room.

After the subjects were seated the researcher described the study and informed the subjects that participation would take approximately 30 minutes. At this point the researcher administered the study materials to the subjects. Before allowing the subjects to begin, the researcher reviewed one of two sets of instructions depending on the randomly assigned condition. In one-half of the sessions, the items on the questionnaire were administered with a categorical eight point Likert scaling system. Consequently the researcher administered the instructions found in Appendix A. In the second one-half of the sessions, the questionnaire was administered with a direct interval-estimation scaling system where a person completely lacking the construct in question (zero points) and a person who was the prototype of the construct in question (100 points) were anchors. In this condition, the researcher administered the response instructions found in Appendix K. The researcher then answered any questions before allowing the subjects to begin.

*Instrumentation.* In addition to a short demographics measure (Appendix B), the questionnaire was composed of 11 independent measures arranged in succession. The 11 measures were designed to measure the constructs of connector, persuader, healthy lifestyle maven, need for affiliation, social anxiety, perspective taking, argumentativeness, empathic concern, value-relevant involvement, opinion leadership, and healthy lifestyle activism. The two versions of the questionnaire contained identical items but different scaling formats. One version was composed of eight point categorical response scales ranging from disagree strongly to agree strongly. The scales were coded to reflect that a response of agree strongly indicated that the respondent possessed more of the construct being measured than a response of disagree strongly. The second version of the questionnaire contained direct interval estimation response scales ranging from zero to 100. In either case, a higher number indicated more of the construct than a lower number.

The refined measures from Study 1 were employed to measure the connector, persuader, healthy lifestyle maven, need for affiliation, perspective taking, empathic concern, opinion leadership and conventional social activism constructs. The measures of social anxiety, argumentativeness, and value-relevant involvement were refined versions of existing measures. The refinements were made across two independent samples by Boster et al. (2006). That study provided data consistent with unidimensional measurement models for measures of social anxiety, argumentativeness, and value-relevant involvement through the removal of several items lacking internal consistency, parallelism, or both on each of the measures.

Specifically, social anxiety was measured with six items from Leary's (1983) interaction anxiousness measure (Appendix L) that measure the extent of the respondent's aversion to social interactions. Leary (1983) showed that this measure is both construct valid in that it correlates substantially with other measures of social anxiety and shyness. Leary (1983) also demonstrated that this measure is reliable, $\alpha$ = .89.

Argumentativeness was measured by seven items from Infante and Rancer's (1982) argumentativeness measure (Appendix M) designed to measure the respondent's predisposition to advocate and defend positions on controversial issues while attacking another's stances on those issues. Infante and Rancer (1982) demonstrated that some initial evidence the measure is a construct valid and reliable, $\alpha$ = .87, indicator of argumentativeness.

Finally, a refined five item version of Cho and Boster's (2005) value-relevant involvement measure (Appendix N) was used to measure the extent to which the healthy lifestyle maven issue was linked to the activation of attitudes that are central to the respondent's values. Cho and Boster (2005) provided content and construct validity evidence for the measure delineating it from two other types of involvement. Cho and Boster (2005) also reported reliability as $\alpha \approx .87$ across several different value domains.

*Results*

CFA was employed to assess the 11 factor measurement model's fit with the Study 2 data. The Hunter and Hamilton (1992) method described in Study 1 was employed to diagnose items failing to exhibit internal consistency, parallelism, or both (Hunter & Gerbing, 1982) and assess model fit across both scaling format conditions.

Seven items exhibiting one or more of these problems were identified (connector 1, healthy lifestyle maven 2, empathic concern 6, social anxiety 6, argumentativeness 2, opinion leader 3, activism 2) and removed from further analyses. Subsequent analyses resulted in an 11 factor model that fit well the data produced by both the categorical Likert scaling and direct interval-estimation scaling. Examination of the nested three factor connector, persuader, and maven measurement model also revealed characteristics of good fit for both scaling formats. Table 5 presents the fit statistics for both models across both scaling formats.

Table 5

*Study 2 CFA Fit Statistics*

| Model | Statistic | Likert | DIE |
|---|---|---|---|
| 11 Factor | Minimum Factor Loading | .51 | .47 |
| | *RMSE* Model | 0.07 | 0.07 |
| | # of Statistically Significant Residuals[1] | 29 | 29 |
| | Maximum Residual | 0.24 | 0.24 |
| 3 Factor | Minimum Factor Loading | .52 | .63 |
| | *RMSE* Model | 0.07 | 0.08 |
| | # of Statistically Significant Residuals[2] | 2 | 6 |
| | Maximum Residual | 0.19 | 0.21 |

*Notes.* DIE = Direct Interval-Estimation, [1] 68 statistically significant residuals by chance when $p < .05$, [2] 8 statistically significant residuals by chance when $p < .05$, N = 300, n = 150

Although the fit statistics in Table 5 demonstrate that the method of scaling had little impact on the overall fit of the model, the factor loadings and factor correlations may have been impacted. Therefore, the Hunter and Hamilton (1992) CFA method was modified to perform a multiple groups CFA. The multiple groups CFA tested for equivalence of the factor loadings and factor correlations across the Likert scaling and direct interval-estimation scaling conditions. The procedures for this test first involved

estimating the parameters of the data collected with the Likert scaling and direct interval-estimation scaling as would be done in a single group CFA. Then, the Likert scaling parameters were used to test the fit of the direct interval-estimation scaling data and the direct interval-estimation scaling parameters were used to test the fit of the Likert scaling data.

Specifically, the measurement model with factor loadings constrained to be equal across the two scaling formats is tested. If the constrained factor loading model fits well (i.e., minimal error between the predicted and obtained correlation matrices), the measurement model with factor loadings and factor correlations constrained to be equal across the two scaling formats is tested. If the data exhibit satisfactory fit given the constraints placed upon these parameters (i.e., factor loadings and factor correlations), then they are consistent with the hypothesis that the two response scale formats have factor loadings and factor correlations within sampling error of each other.

The results of the multiple groups CFA indicated that the factor loadings and factor correlations are indeed equivalent across scaling formats. The fit of the constrained factor loading, unconstrained factor correlation 11 factor measurement model was found to fit acceptably across the scaling formats. The Likert scaling to direct interval-estimation scaling comparison produced a *RMSE* = .08 and a maximum residual of .27. The direct interval-estimation scaling to Likert scaling comparison resulted in a *RMSE* = .08 and a maximum residual of .27. Finally, both scaling formats demonstrated satisfactory fit with the 11 factor measurement model where factor loadings and factor correlations were both constrained to be equal. In the Likert scaling to direct interval-estimation scaling comparison, *RMSE* = .11 and the maximum residual was .31. In the

direct interval-estimation scaling to Likert scaling comparison, *RMSE* = .10 and the maximum residual was .30.

Results of the multiple groups CFA for the nested three factor connector, persuader, and healthy lifestyle maven model also were consistent with the conclusion that the method of scaling did not cause factor loading or factor correlation differences. Both scaling formats were found to fit well with the constrained factor loading, unconstrained factor correlation three factor measurement model (Likert scaling to direct interval-estimation scaling: *RMSE* = .10, maximum residual = .28; direct interval-estimation scaling to Likert scaling: *RMSE* = .09 , maximum residual = .21) and the three factor measurement model with factor loadings and factor correlations constrained to be equal, (Likert scaling to direct interval-estimation scaling: *RMSE* = .12, maximum residual = .30; direct interval-estimation scaling to Likert scaling: *RMSE* = .11, maximum residual = .25).

The psychometric properties of the scaling formats were not entirely alike, however. Direct interval-estimation scaling did result in modestly larger estimates of reliability than categorical Likert scaling; albeit, these differences were not statistically significant. The mean *S.I.* $\alpha$ = .87, $s$ = .06, across all 11 measures when direct interval-estimation scaling was employed as opposed to a mean *S.I.* $\alpha$ = .86, $s$ = .06, when categorical Likert scaling was used.

The impact of scaling format on reliability estimates was greater when considering only the connector, persuader, and healthy lifestyle maven measures where the mean *S.I.* $\alpha$ = .92, $s$ = .02, for direct interval-estimation scaling as opposed to a mean *S.I.* $\alpha$ = .90, $s$ = .03, for categorical Likert scaling. As was the case in Study 1,

improvements to the persuader and maven measures approximated the Spearman-Brown predictions. Furthermore, although the reliability of the connector measure still did not meet the Spearman-Brown estimate, the reliability and distribution characteristics were nonetheless improved. Consequently, although the new items and scaling format modification did not lead to the ideal improvements predicted by Spearman-Brown, they still lead to improvements in psychometric qualities of the measure.

Additionally, although the increase in reliability estimates was not as substantial as that reported by Silverman and Johnston (1975) it is still important. The weaker effect is most likely explained by the fact that reliability estimates in this study, unlike the Silverman and Johnson (1975) study, were substantial from the onset. Direct interval-estimation functions to increase reliability estimates through increasing the item variance which increases item correlations. Furthermore, increases in reliability estimates resulting from item correlation increases attenuate as the item correlation increases. This inverse relationship means that the rate of change in the reliability estimate slows as item correlation increases and the effect size will be correlated negatively with the measure's original reliability estimate. Therefore, although the difference between .92 and .90 is numerically small, it is not insignificant. The change was consistent across the different measures and was a 20% increase in what is possible. Therefore, given the content validity equivalence between the direct interval-estimation scaling and categorical Likert scaling formats and the superior reliability estimates afforded by direct interval-estimation scaling, the remaining analyses will be conducted on the direct interval-estimation data. Table 6 presents the factor loadings and factor correlation matrix for the direct interval-estimation measurement model.

Table 6

*Study 2 Direct Interval-Estimation Factor Loadings and Factor Correlation Matrix*

| Item | Con | Per | Ma | Aff | Pers | Em | Anx | Arg | Inv | Opi | Act |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Con 2 | 0.82 | 0.28 | 0.09 | 0.18 | 0.13 | 0.04 | -0.38 | 0.05 | 0.15 | 0.19 | 0.06 |
| Con 3 | 0.78 | 0.29 | 0.05 | 0.35 | 0.17 | 0.17 | -0.55 | 0.15 | 0.07 | 0.20 | 0.10 |
| Con 4 | 0.63 | 0.43 | 0.17 | 0.29 | 0.23 | 0.12 | -0.27 | 0.26 | 0.12 | 0.19 | 0.04 |
| Con 6 | 0.86 | 0.34 | 0.17 | 0.29 | 0.19 | 0.15 | -0.36 | 0.19 | 0.16 | 0.23 | 0.19 |
| Con 9 | 0.90 | 0.34 | 0.26 | 0.35 | 0.21 | 0.21 | -0.40 | 0.23 | 0.12 | 0.27 | 0.22 |
| Per 1 | 0.35 | 0.76 | 0.20 | 0.06 | 0.19 | 0.15 | -0.20 | 0.49 | 0.19 | 0.23 | 0.10 |
| Per 3 | 0.25 | 0.80 | 0.03 | -0.01 | 0.03 | 0.00 | -0.21 | 0.53 | 0.13 | 0.11 | 0.02 |
| Per 4 | 0.34 | 0.91 | 0.03 | 0.03 | 0.06 | -0.01 | -0.29 | 0.50 | 0.08 | 0.08 | -0.02 |
| Per 5 | 0.36 | 0.88 | 0.00 | 0.00 | 0.09 | -0.01 | -0.26 | 0.43 | 0.06 | 0.08 | -0.08 |
| Per 6 | 0.38 | 0.82 | 0.08 | 0.01 | 0.20 | -0.01 | -0.26 | 0.44 | 0.07 | 0.11 | 0.00 |
| Per 7 | 0.38 | 0.85 | 0.17 | 0.05 | 0.26 | 0.14 | -0.24 | 0.46 | 0.09 | 0.17 | 0.08 |
| Per 9 | 0.38 | 0.86 | 0.09 | 0.07 | 0.11 | 0.02 | -0.31 | 0.47 | 0.05 | 0.12 | 0.05 |
| Per 10 | 0.32 | 0.73 | 0.09 | 0.00 | 0.11 | 0.08 | -0.28 | 0.49 | 0.00 | 0.17 | 0.09 |
| Ma 4 | 0.22 | 0.12 | 0.77 | 0.22 | 0.26 | 0.13 | 0.01 | 0.13 | 0.52 | 0.69 | 0.38 |
| Ma 5 | 0.12 | -0.01 | 0.84 | 0.27 | 0.15 | 0.14 | 0.06 | 0.14 | 0.47 | 0.59 | 0.45 |
| Ma 6 | 0.10 | 0.01 | 0.90 | 0.23 | 0.19 | 0.23 | 0.05 | 0.14 | 0.48 | 0.65 | 0.47 |
| Ma 8 | 0.24 | 0.17 | 0.77 | 0.20 | 0.24 | 0.13 | -0.05 | 0.25 | 0.49 | 0.65 | 0.46 |
| Ma 9 | 0.11 | 0.14 | 0.84 | 0.14 | 0.21 | 0.23 | 0.03 | 0.21 | 0.48 | 0.73 | 0.47 |
| Ma 10 | 0.12 | 0.09 | 0.86 | 0.26 | 0.22 | 0.20 | 0.03 | 0.17 | 0.59 | 0.78 | 0.45 |
| Aff 2 | 0.22 | 0.04 | 0.22 | 0.59 | 0.15 | 0.22 | -0.25 | 0.14 | 0.14 | 0.22 | 0.24 |
| Aff 3 | 0.33 | 0.05 | 0.17 | 0.92 | 0.19 | 0.29 | -0.18 | 0.11 | 0.21 | 0.17 | 0.14 |
| Aff 6 | 0.30 | 0.02 | 0.20 | 0.86 | 0.24 | 0.30 | -0.17 | 0.14 | 0.22 | 0.23 | 0.15 |
| Aff 8 | 0.19 | -0.02 | 0.16 | 0.47 | 0.36 | 0.27 | -0.09 | 0.02 | 0.03 | 0.14 | 0.02 |
| Pers 1 | 0.19 | 0.03 | 0.21 | 0.24 | 0.78 | 0.49 | -0.18 | -0.14 | 0.03 | 0.26 | 0.10 |
| Pers 3 | 0.17 | 0.19 | 0.26 | 0.30 | 0.87 | 0.39 | -0.19 | 0.03 | 0.13 | 0.31 | 0.14 |
| Pers 6 | 0.15 | 0.13 | 0.16 | 0.26 | 0.70 | 0.38 | -0.12 | 0.14 | 0.03 | 0.25 | 0.13 |
| Pers 7 | 0.22 | 0.15 | 0.18 | 0.26 | 0.81 | 0.37 | -0.19 | -0.03 | 0.10 | 0.29 | 0.04 |
| Em 3 | 0.16 | 0.17 | 0.11 | 0.21 | 0.39 | 0.75 | -0.04 | 0.07 | 0.10 | 0.15 | 0.15 |
| Em 4 | 0.10 | -0.11 | 0.17 | 0.35 | 0.43 | 0.75 | 0.02 | -0.04 | 0.09 | 0.22 | 0.18 |
| Em 7 | 0.12 | 0.05 | 0.17 | 0.26 | 0.29 | 0.64 | 0.01 | 0.03 | 0.00 | 0.17 | 0.05 |
| Anx 1 | -0.26 | -0.27 | 0.14 | -0.15 | -0.08 | 0.07 | 0.80 | 0.05 | 0.21 | 0.18 | 0.14 |
| Anx 2 | -0.24 | -0.10 | 0.04 | -0.10 | -0.08 | 0.00 | 0.68 | 0.02 | 0.17 | 0.09 | 0.05 |
| Anx 3 | -0.39 | -0.20 | -0.11 | -0.16 | -0.12 | -0.05 | 0.54 | -0.14 | 0.00 | -0.15 | -0.20 |
| Anx 4 | -0.35 | -0.25 | -0.02 | -0.24 | -0.24 | -0.06 | 0.53 | -0.07 | 0.01 | -0.16 | -0.02 |
| Anx 5 | -0.30 | -0.17 | 0.02 | -0.12 | -0.16 | 0.02 | 0.61 | 0.01 | 0.16 | 0.00 | -0.02 |

Table 6 (cont'd)

| Item | Con | Per | Ma | Aff | Pers | Em | Anx | Arg | Inv | Opi | Act |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arg 1 | 0.21 | 0.42 | 0.09 | 0.21 | 0.00 | 0.03 | -0.06 | 0.69 | 0.04 | 0.08 | 0.10 |
| Arg 3 | 0.20 | 0.34 | 0.18 | 0.11 | 0.11 | 0.07 | -0.07 | 0.76 | 0.13 | 0.20 | 0.22 |
| Arg 4 | 0.20 | 0.55 | 0.12 | 0.10 | 0.03 | 0.00 | -0.06 | 0.73 | 0.14 | 0.16 | 0.08 |
| Arg 5 | 0.17 | 0.47 | 0.19 | 0.10 | -0.04 | 0.01 | -0.01 | 0.84 | 0.09 | 0.24 | 0.18 |
| Arg 6 | 0.15 | 0.52 | 0.23 | 0.06 | -0.03 | 0.00 | -0.03 | 0.87 | 0.18 | 0.21 | 0.19 |
| Arg 7 | 0.14 | 0.45 | 0.17 | 0.12 | -0.06 | 0.02 | 0.03 | 0.87 | 0.16 | 0.25 | 0.20 |
| Inv 1 | 0.12 | 0.08 | 0.51 | 0.20 | 0.06 | 0.05 | 0.16 | 0.15 | 0.76 | 0.54 | 0.42 |
| Inv 2 | 0.12 | 0.10 | 0.47 | 0.22 | 0.11 | -0.01 | 0.16 | 0.14 | 0.88 | 0.57 | 0.35 |
| Inv 3 | 0.15 | 0.10 | 0.57 | 0.17 | 0.10 | 0.05 | 0.12 | 0.14 | 0.93 | 0.66 | 0.46 |
| Inv 4 | 0.12 | 0.12 | 0.51 | 0.12 | 0.09 | 0.14 | 0.19 | 0.17 | 0.92 | 0.59 | 0.44 |
| Inv 5 | 0.15 | 0.05 | 0.55 | 0.19 | 0.04 | 0.15 | 0.11 | 0.06 | 0.80 | 0.62 | 0.41 |
| Opi 4 | 0.20 | 0.10 | 0.66 | 0.18 | 0.27 | 0.17 | -0.04 | 0.16 | 0.56 | 0.79 | 0.46 |
| Opi 5 | 0.25 | 0.12 | 0.65 | 0.23 | 0.30 | 0.23 | -0.04 | 0.17 | 0.60 | 0.91 | 0.52 |
| Opi 6 | 0.24 | 0.19 | 0.76 | 0.26 | 0.30 | 0.22 | 0.06 | 0.28 | 0.59 | 0.82 | 0.58 |
| Act 3 | 0.06 | -0.02 | 0.40 | 0.12 | 0.07 | 0.04 | -0.03 | 0.09 | 0.40 | 0.46 | 0.75 |
| Act 4 | 0.10 | 0.04 | 0.45 | 0.18 | 0.08 | 0.19 | 0.02 | 0.14 | 0.43 | 0.55 | 0.85 |
| Act 5 | 0.20 | 0.10 | 0.43 | 0.14 | 0.18 | 0.21 | -0.04 | 0.25 | 0.34 | 0.52 | 0.74 |
| Act 6 | 0.15 | 0.00 | 0.49 | 0.19 | 0.11 | 0.15 | -0.01 | 0.19 | 0.43 | 0.52 | 0.95 |

| Factor | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Con | | | | | | | | | | |
| Per | 0.42 | | | | | | | | | |
| Mav | 0.18 | 0.10 | | | | | | | | |
| Aff | 0.37 | 0.03 | 0.27 | | | | | | | |
| Persp | 0.23 | 0.16 | 0.25 | 0.33 | | | | | | |
| Emp | 0.17 | 0.05 | 0.21 | 0.38 | 0.52 | | | | | |
| Anx | -0.49 | -0.31 | 0.02 | -0.24 | -0.22 | -0.01 | | | | |
| Arg | 0.22 | 0.58 | 0.21 | 0.15 | 0.00 | 0.03 | -0.04 | | | |
| Inv | 0.15 | 0.10 | 0.61 | 0.21 | 0.09 | 0.09 | 0.17 | 0.15 | | |
| Opin | 0.27 | 0.16 | 0.82 | 0.27 | 0.35 | 0.25 | -0.01 | 0.24 | 0.69 | |
| Act | 0.15 | 0.04 | 0.54 | 0.19 | 0.13 | 0.18 | -0.02 | 0.20 | 0.49 | 0.62 |

*Notes*. Con = Connector, Per = Persuader, Mav = Healthy Lifestyle Maven, Aff = Need for Affiliation, Pers = Perspective Taking, Emp = Empathic Concern, Anx = Social Anxiety, Arg = Argumentativeness, Inv = Value-Relevant Involvement, Opin = Opinion Leadership, Act = Healthy Lifestyle Activism, n = 150

Because a fitting measurement model was found, the mean response across each measure's items was computed to form 11 indices. The connector index ranged from 11.00 to 100.00 and was distributed approximately normally, $M = 62.65$, $s = 21.34$, $\alpha = .90$, *S.I.* $\alpha = .90$. Scores on the persuader index ranged from 14.00 to 100.00. The persuader distribution had a slight negative skew, $M = 68.04$, $s = 17.33$, $\alpha = .94$, and *S.I.* $\alpha = .94$. The distribution of the healthy lifestyle maven index, ranging from .67 to 100.00, approached normality, $M = 54.89$, $s = 24.03$. The reliability, estimated by $\alpha = .93$ and *S.I.* $\alpha = .93$. The distribution of the need for affiliation index was negatively skewed and leptokurtic (Range = 5.00 – 100.00), $M = 84.19$, $s = 13.15$, $\alpha = .78$, *S.I.* $\alpha = .80$. Responses on the perspective taking index, ranging from 11.15 to 100.00, were approximately normally distributed, $M = 66.76$, $s = 20.17$, $\alpha = .86$, *S.I.* $\alpha = .87$. The empathic concern index was distributed with a slight negative skew and ranged from 15.00 to 100.00. The indices mean response was 76.32 ($s = 17.38$), $\alpha = .76$, *S.I.* $\alpha = .76$. Scores on the social anxiety index were distributed approximately normal between 0.00 and 100.00, $M = 41.51$, $s = 21.95$, $\alpha = .77$, *S.I.* $\alpha = .77$. The argumentativeness index ranged from 2.50 to 100.00 and was also distributed approximately normally, $M = 59.42$, $s = 23.70$, $\alpha = .91$, *S.I.* $\alpha = .91$. Scores on the value-relevant involvement index ranged from .00 to 100.00. The value-relevant involvement distribution approached normality, $M = 56.14$, $s = 25.02$, $\alpha = .93$, and *S.I.* $\alpha = .93$. Scores on the opinion leader index were distributed approximately normal, ranging from 0.00 to 95.00. The opinion leader distribution had a mean of 37.20 ($s = 24.52$). The reliability, estimated by $\alpha = .88$ and *S.I.* $\alpha = .88$. Finally, the healthy lifestyle activism index was distributed with a slight positive skew (Range = 0.00 – 100.00), $M = 28.69$, $s = 24.36$, $\alpha = .88$, *S.I.* $\alpha = .89$. These direct

interval-estimation data appear to be in the same range as those reported in the measures' source materials. Table 7 presents a summary of the indices descriptive statistics.

Table 7

*Study 2 Measure Descriptives*

| Measure | *M* | *s* | *Min - Max* | α | *S.I.* α | *Skewness* | *Kurtosis* |
|---|---|---|---|---|---|---|---|
| Connector | 62.65 | 21.34 | 11.00 - 100.00 | 0.90 | 0.90 | -0.38 | -0.45 |
| Persuader | 68.04 | 17.33 | 14.00 - 100.00 | 0.94 | 0.94 | -0.65 | 0.28 |
| Maven | 54.89 | 24.03 | 0.67 - 100.00 | 0.93 | 0.93 | -0.24 | -0.79 |
| Affiliation | 84.19 | 13.15 | 5.00 - 100.00 | 0.78 | 0.80 | -1.94 | 8.27 |
| Perspective | 66.76 | 20.17 | 11.25 - 100.00 | 0.86 | 0.87 | -0.37 | -0.54 |
| Empathic | 76.32 | 17.38 | 15.00 - 100.00 | 0.76 | 0.76 | -0.85 | 0.33 |
| Anxiety | 41.51 | 21.95 | 0.00 - 100.00 | 0.77 | 0.77 | 0.27 | -0.35 |
| Argue | 59.42 | 23.70 | 2.50 - 100.00 | 0.91 | 0.91 | -0.10 | -0.69 |
| Involvement | 56.14 | 25.02 | 0.00 - 100.00 | 0.93 | 0.93 | -0.40 | -0.59 |
| Opinion | 37.21 | 24.52 | 0.00 - 95.00 | 0.88 | 0.88 | 0.31 | -0.74 |
| Activism | 28.69 | 24.36 | 0.00 - 100.00 | 0.88 | 0.89 | 0.70 | -0.33 |

*Notes.* Maven = Healthy Lifestyle Maven, Affiliation = Need for Affiliation, Perspective = Perspective Taking, Empathic = Empathic Concern, Anxiety = Social Anxiety, Argue = Argumentativeness, Involvement = Value-Relevant Involvement, Opinion = Opinion Leadership, Activism = Healthy Lifestyle Activism, n = 150

Examination of the relationships between the demographic variables and the connector, persuader, and healthy lifestyle maven measures demonstrated results similar to those observed in Study 1. There were no substantial relationships between the superdiffuser measures and the demographic variables, except for the relationships between sex and the persuader measure. Men's persuader scores were slightly greater than women's scores in Study 2. The mean women's score equaled 65.54 whereas the mean men's score equaled 71.88 ($r$ = .18, $r'$ = .19) which could be a result of the scaling format sensitizing the measure due to the increased scaling range.

The construct validity results which are based on the factor correlations presented as nomological networks in Figures 6 through 8 indicated that the observed networks were consistent with the networks hypothesized, albeit with some errors. The connector

construct correlated substantially with social anxiety, $r' = -.49$, P ($-.64 \leq \rho' \leq -.32$) = .95, and need for affiliation, $r' = .37$, P ($.19 \leq \rho' \leq .54$) = .95, as hypothesized. Inconsistent with the hypotheses, but not unexpected given the Study 1 regression analyses, the connector construct failed to correlate substantially with healthy lifestyle activism, $r' = .15$, and had a modest, but statistically significant, correlation with opinion leadership, $r' = .27$, P ($.10 \leq \rho' \leq .44$) = .95. The connector construct also correlated modestly with argumentativeness, $r' = .22$, P ($.06 \leq \rho' \leq .39$) = .95, and perspective taking, $r' = .23$, P ($.07 \leq \rho' \leq .41$) = .95, which is inconsistent with the hypotheses but not entirely unexpected. Finally, consistent with hypotheses, the connector construct did not correlate substantially with value-relevant involvement, $r' = .15$, or empathic concern, $r' = .17$.

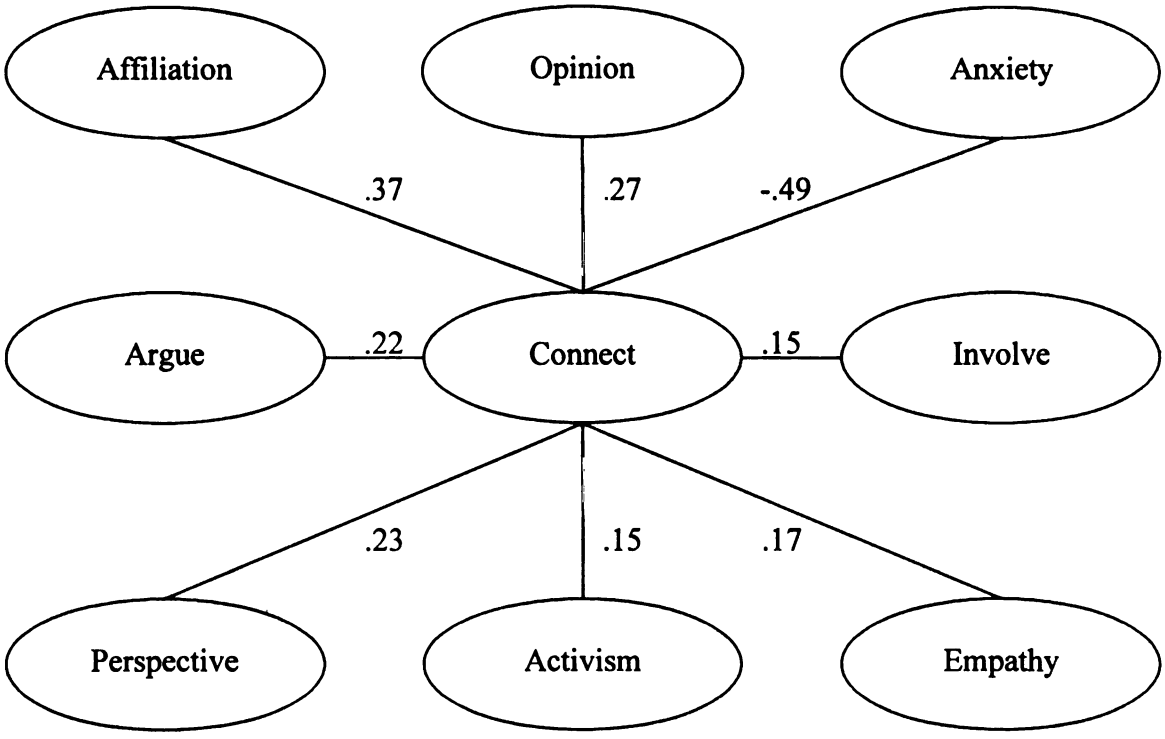


*Figure 6.* Convergent and divergent validity nomological network for the connector construct.

*Notes.* Connect = Connector, Anxiety = Social Anxiety, Argue = Argumentativeness, Involve = Value-Relevant Involvement, Affiliation = Need for Affiliation, Perspective = Perspective Taking, Empathy = Empathic Concern, Opinion = Opinion Leadership, Activism = Healthy Lifestyle Activism, correlations reported have been corrected for attenuation due to measurement error, n = 150

Although the observed persuader network was somewhat less consistent with the hypothesized nomological network than the connector network, the results were still informative. The persuader construct correlated with argumentativeness as hypothesized, $r' = .58$, P ($.44 \leq \rho' \leq .70$) = .95. The same was not true for perspective taking, $r' = .16$, indicating that the ability to adopt another's psychological point of view is not related to persuasiveness. Much like the connector construct, the persuader construct also failed to correlate considerably with opinion leadership, $r' = .16$, and healthy lifestyle activism, $r' = .04$. This failure, however, is consistent with the regression findings of Study 1.

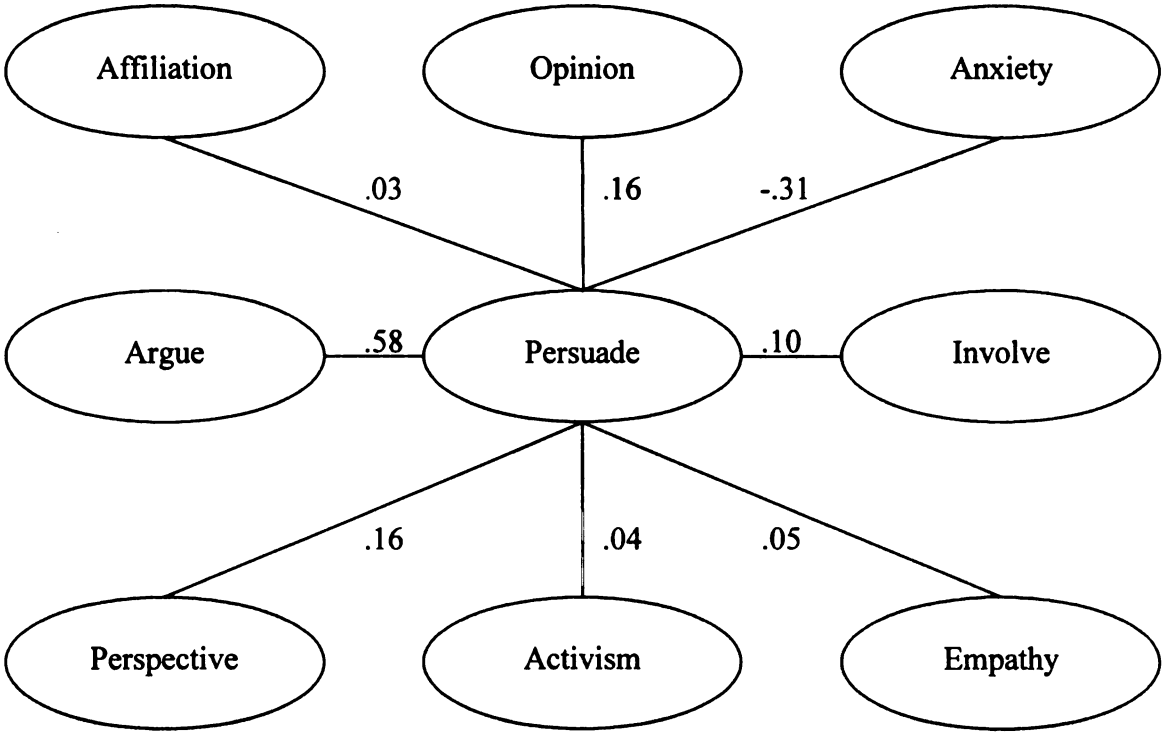


*Figure 7.* Convergent and divergent validity nomological network for the persuader construct.

*Notes.* Persude = Persuader, Anxiety = Social Anxiety, Argue = Argumentativeness, Involve = Value-Relevant Involvement, Affiliation = Need for Affiliation, Perspective = Perspective Taking, Empathy = Empathic Concern, Opinion = Opinion Leadership, Activism = Healthy Lifestyle Activism, correlations reported have been corrected for attenuation due to measurement error, n = 150

Consistent with the network hypotheses, the persuader construct failed to correlate substantially with need for affiliation, $r' = .03$, value-relevant involvement, $r' =$

.10, or empathic concern, $r' = .05$. On the other hand, the persuader construct did correlate modestly with social anxiety, $r' = -.31$, P ($-.48 \leq \rho' \leq -.13$) = .95. Although this convergent correlation was hypothesized as a divergent relationship, its presence replicates the same relationship observed in Boster et al. (2006) and is consistent with the assertion that the expression of the persuader construct involves social interaction which would be attenuated by traits like social anxiety or communication apprehension (McCroskey, Beatty, Kearney, & Plax, 1985).

The healthy lifestyle maven network was, in the main, consistent with the hypothesized nomological network. The healthy lifestyle maven construct correlated substantially with value-relevant involvement, $r' = .61$, P ($.49 \leq \rho' \leq .73$) = .95. The healthy lifestyle maven construct only correlated modestly, however, with empathic concern, $r' = .21$, P ($.04 \leq \rho' \leq .39$) = .95, indicating that the tendency to experience feelings of concern for others in need may not be related strongly to the maven construct. Consistent with the regression analyses in Study 1, the healthy lifestyle maven construct correlated considerably with opinion leadership, $r' = .82$, P ($.74 \leq \rho' \leq .90$) = .95, and healthy lifestyle activism, $r' = .54$, P ($.41 \leq \rho' \leq .67$) = .95. Finally, the healthy lifestyle maven construct correlated within sampling error of zero with its hypothesized divergent construct of social anxiety, $r' = .02$, and modestly with its hypothesized divergent constructs of need for affiliation, $r' = .27$, P ($.09 \leq \rho' \leq .44$) = .95, argumentativeness, $r' = .21$, P ($.04 \leq \rho' \leq .37$) = .95, and perspective taking, $r' = .25$, P ($.09 \leq \rho' \leq .42$) = .95.

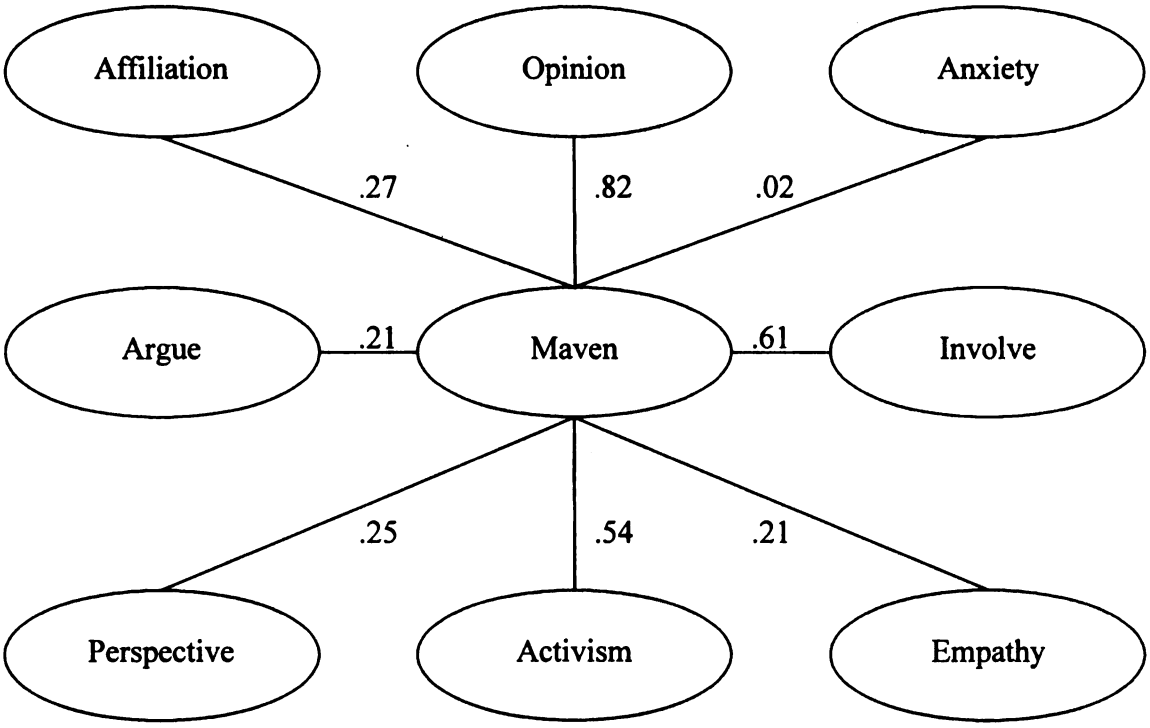


*Figure 8.* Convergent and divergent validity nomological network for the healthy lifestyle maven construct.

*Notes.* Maven = Healthy Lifestyle Maven, Anxiety = Social Anxiety, Argue = Argumentativeness, Involve = Value-Relevant Involvement, Affiliation = Need for Affiliation, Perspective = Perspective Taking, Empathy = Empathic Concern, Opinion = Opinion Leadership, Activism = Healthy Lifestyle Activism, correlations reported have been corrected for attenuation due to measurement error, n = 150

As was the case in Study 1, the factor correlations in the nomological network suggest that the connector and persuader constructs may contribute little more to the ability to predict opinion leadership and healthy lifestyle activism than what can be accounted for by the healthy lifestyle maven construct. Therefore, multiple regression analyses were again employed, regressing opinion leadership onto the connector, persuader, and healthy lifestyle maven measures as well as all two-way and three-way interactions. The standardized regression coefficient for the connector measure was $\beta$ = .08 ($t$ (142) = 1.24, *ns*, $\beta'$ = .08), for the persuader measure was $\beta$ = .05 ($t$ (142) = 0.88, *ns*, $\beta'$ = .05), and for the healthy lifestyle maven measure was $\beta$ = .67 ($t$ (142) = 11.07, $p$ < .05, $\beta'$ = .75). When healthy lifestyle activism scores were regressed onto the

connector, persuader, and healthy lifestyle maven indices, as well as all two-way and three-way interaction terms, a similar effect was observed. Again, the healthy lifestyle maven measure emerged as the only major predictor ($\beta = .47, t\,(142) = 5.84, p < .05, \beta' = .53$). Table 8 presents the regression models.

Table 8

*Study 2 Regression Models*

| Model | Component | *B* | se | *β* | *t* | sig | *B'* |
|---|---|---|---|---|---|---|---|
| Opinion Leadership | Constant | 37.04 | 1.42 | | 26.18 | $p < .05$ | |
| $F\,(7, 142) = 28.38$ | C | 0.09 | 0.07 | 0.08 | 1.24 | ns | 0.08 |
| $p < .05$ | P | 0.08 | 0.09 | 0.05 | 0.88 | ns | 0.05 |
| $R_{adj} = .75$ | M | 0.68 | 0.06 | 0.67 | 11.07 | $p < .05$ | 0.75 |
| | C x P | 0.00 | 0.00 | -0.01 | -0.14 | ns | -0.03 |
| | C x M | 0.00 | 0.00 | -0.06 | -0.93 | ns | -0.04 |
| | P x M | 0.00 | 0.00 | -0.01 | -0.09 | ns | -0.02 |
| | C x P x M | 0.00 | 0.00 | 0.16 | 2.55 | $p < .05$ | 0.15 |
| Activism | Constant | 28.72 | 1.88 | | 15.27 | $p < .05$ | |
| $F\,(7, 142) = 6.89$ | C | 0.07 | 0.09 | 0.06 | 0.79 | ns | 0.07 |
| $p < .05$ | P | -0.05 | 0.11 | -0.04 | -0.46 | ns | -0.06 |
| $R_{adj} = .47$ | M | 0.48 | 0.08 | 0.47 | 5.84 | $p < .05$ | 0.53 |
| | C x P | 0.00 | 0.00 | 0.00 | 0.04 | ns | -0.01 |
| | C x M | 0.00 | 0.00 | -0.01 | -0.14 | ns | 0.01 |
| | P x M | 0.00 | 0.01 | -0.09 | -1.07 | ns | -0.10 |
| | C x P x M | 0.00 | 0.00 | 0.07 | 0.82 | ns | 0.05 |

*Notes.* C = Connector, P = Persuader, M = Healthy Lifestyle Maven, components are mean centered to reduce multicollinearity, n = 150

Finally, quantifying superdiffusers as people responding at least one standard deviation above the mean on the connector, persuader, and healthy lifestyle maven measures revealed that 4% of this study's sample was superdiffusers. The deviation in the percentage of the sample classified as superdiffusers from Study 1 to Study 2 likely results from a sensitization of the measurement due to the increased range of the direct

interval-estimation scaling. A similar percentage increase was observed in Boster et al. (2006) when that study changed the item scaling from a 5 point Likert response scale to an 8 point Likert response scale.

*Discussion*

Results from Study 2 provided more evidence for the content validity of the connector, persuader, and maven measures. The *CFA* results demonstrated more evidence that the three measures are internally consistent and parallel, not just amongst each other but across measures of other constructs as well. Furthermore, the multiple groups *CFA* demonstrated that the method of scaling did not alter the factor structure of the measures. In all, the factor structures of the items composing the connector, persuader, and healthy lifestyle maven measures appear stable across multiple independent samples and scaling formats.

The scaling format did, however, produce a modest change in the reliability estimates of the measures. Specifically, direct interval-estimation increased reliability estimates relative to eight point categorical Likert response scaling. Although the effect was fairly consistent across measures there was one condition where the effect was not observed. Direct interval-estimation failed to increase the reliability of measures containing several reverse coded items. Based on a cursory review of responses, the reason for this effect seems to result from respondent difficulty in correctly inverting their response on the reverse coded items. For example, a response of 80 on a standard coded item dictates the response of 20 on a reverse coded item of equal quality taken from the same content domain. Respondents in this sample, however, quite consistently offered imperfect reflections of their standard responses. Levine (1994) observed a

similar effect in his study of direct magnitude estimation where respondents had difficulty responding when they fell below the reference stimulus. For measures containing no reverse coded items, however, direct interval-estimation bolstered the reliability estimates quite consistently.

Interestingly, the change in the scaling format also appears to have sensitized the measure's ability to detect superdiffusers. Across three previous samples, 1.7% of subjects have been classified as superdiffusers according to their responses on the connector, persuader, and healthy lifestyle maven measures. This study's categorical Likert scaling condition closely approximated that percentage with 1.3% classified as superdiffusers. The direct interval-estimation condition, however, classified 4% of the sample as superdiffusers employing the same criteria. The sensitization results from direct interval-estimation normalizing the response distributions of each measure, thus lowering the mean and increasing the number of people above one standard deviation from the mean. Consequently, in addition to increasing the reliability estimates of the connector, persuader, and healthy lifestyle maven measures, direct interval-estimation will make it easier to identify potential superdiffusers in the population.

The nomological network analysis in Study 2 provided additional construct validity evidence for the connector, persuader, and healthy lifestyle maven measures. The hypothesized convergent correlations were ample and the hypothesized divergent correlations were small, albeit with a few exceptions. For example, the convergent correlations between the persuader construct and perspective taking as well as between the healthy lifestyle maven construct and empathic concern were modest. This failure could indicate that the two variables are not conceptually related, it could also indicate

that at least one of the measures is not indicative of what it purports to measure. As another example, the connector construct correlated substantially with argumentativeness and perspective taking, which were hypothesized as divergent correlations. This failure could also be the result of a measurement validity issue or the presence of an unmeasured construct sharing a relationship among the three constructs.

These network failures highlight one of the limitations of the nomological network approach or multi-trait multi-approach (Campbell & Fiske, 1959) to construct validity assessment. There is no good method of determining how much network fit is necessary to conclude that a measure or set of measures exhibit construct validity. That being said there were no severe misfits in this network. In other words, there were no misfits that could not be reasonably explained by revisiting theory or of such a magnitude that they could not potentially be attributed to sampling error. Therefore, there is substantial evidence of construct validity for the connector, persuader, or maven measures.

Finally, the regression analyses conducted in Study 2 replicated closely the findings of Study 1, again indicating that what others have called opinion leadership and healthy lifestyle activism is, in the main, the extent to which one is a healthy lifestyle maven and that alone. Furthermore, implementation of direct interval-estimation did not change the finding that the connector and persuader constructs contribute little to the relationships between super diffusion and opinion leadership or super diffusion and activism. This finding is an interesting effect which deserves attention in its own right and suggests that a superdiffuser is something other than an opinion leader or activist.

Thus far, evidence for the content and construct validity of the superdiffuser measures is ample. The extent to which self-reports on the measures correspond to actual behavior has not yet been the focus of examination, however. Therefore, Study 3 will undertake a predictive validity assessment by testing the extent to which behaviors indicative of each of the three characteristics correspond to self reported responses on the connector, persuader, and healthy lifestyle maven measures. It is hypothesized that there will be substantial positive correlations between: 1) connector scores and the number of acquaintances people know, 2) persuader scores and a people's argumentative complexity, and 3) healthy lifestyle maven scores and scores on a healthy lifestyle knowledge test.

## STUDY 3

### *Method*

*Subjects.* The third study sampled 35 female students who were at least 18 years old, enrolled in undergraduate Communication classes at a large Midwestern university, and had not participated in Studies 1 or 2. These students received compensation for their participation in the form of course credit. Subjects were on average 19.66 ($s$ = 1.63) years old and in the 2.31 ($s$ = 1.11) year of college. Finally, 23% of subjects reported holding a leadership position since beginning college.

*Design.* Study 3 was designed as a predictive validity test for the connector, persuader, and healthy lifestyle maven measures. Consequently, scores on each of the connector, persuader, and healthy lifestyle maven measures were used to predict scores on a corresponding criterion measure. Connector scores were expected to predict the respondent's number of acquaintances as measured by a phonebook test, persuader scores were expected to predict argumentative complexity, and healthy lifestyle maven scores were expected to predict healthy lifestyle knowledge if the superdiffuser measures did indeed possess predictive validity.

*Procedures.* Subjects volunteering to participate in a study described as an investigation of communication and social behavior arrived individually at the researcher's laboratory for a scheduled session lasting approximately 45 minutes per subject. Subjects were greeted by the researcher and seated at a desk. The researcher informed the subject that participation involved the completion of two main tasks. The first task involved the completion of a questionnaire containing several measures of social opinion and social behavior, which took approximately 15 minutes to complete.

The second task was a structured audio taped interview of the subject focusing on the subject's position on a healthy lifestyle topic, which took approximately 30 minutes to complete.

After informing the subject of the tasks, the questionnaire was administered and a brief set of instructions regarding how to complete the items on the questionnaire was reviewed before allowing the subjects to begin. After the questionnaire was completed and returned to the researcher, the tape recorder was started and the subjects were interviewed on their position towards dieting according to the protocol in Appendix O. After completing both tasks, subjects were dismissed.

*Instrumentation.* In addition to several demographic items and the direct interval-estimation scaled connector, persuader, and healthy lifestyle maven measures, the questionnaire in Study 3 contained measures of two predictive validity criteria. The connector criterion took the form of a phonebook test initially proposed by Gladwell (2002) (Appendix P). By definition, the extent to which someone is a connector is in part how many acquaintances they have. To test this premise using the phonebook test, four of the most common last names beginning with each letter in the alphabet were selected from a campus directory resulting in a list of 104 common last names. Subjects were instructed to indicate every time a last name on the list was shared with an acquaintance of theirs. As the number of acquaintances a person had increased, the probability that the last names of their acquaintances would appear on the list also increased. Therefore, given that the phonebook test was an indicator of how many acquaintances a person had, it also served as a predictive validity test for the connector measure.

The questionnaire also contained the healthy lifestyle maven predictive validity criterion. Mavens, by definition, develop expert knowledge in a content domain. Therefore, self-reported maven levels must be predictive of knowledge in the content domain of interest. To test this assertion, a healthy lifestyle knowledge test (Appendix Q) was developed from two modified health knowledge tests (Centers for Disease Control and Prevention, 2005; Centers for Disease Control and Prevention, 2006). This test contained items reflecting health knowledge concerns such as exercise, nutrition, reproductive health (including sexually transmitted infections), heart disease, and cancer. Several of these content areas (exercise, nutrition, and reproductive health) were identified as major healthy lifestyle concerns in a pretest drawn from the same population as this study's sample. Each item on the healthy lifestyle knowledge test was scored as correct or incorrect. The greater the number of correct to items was indicative of greater health knowledge. Consequently, the extent to which the healthy lifestyle maven construct correlated highly with healthy lifestyle knowledge test scores was indicative of the predictive validity of the maven measure.

*Interview*. The persuader criterion of argumentative complexity was measured through the subject's interview responses. Subjects were interviewed by the researcher for their position on the issue of dieting. Dieting was chosen because a pretest sample indicated that dieting was a substantial health concern of the female population that was sampled. Consequently, subjects would be likely to have existing attitudes towards dieting. These extant attitudes were important because interview questions asked the subjects for detailed reports of reasons for holding their position. Furthermore, given that the interview asked subjects to report counterarguments against their position, it was also

important that an issue was chosen where arguments and evidence both for and against the issue exist.

The structure of the interview was an adaptation of Kuhn's (1991) protocol which elicited responses indicative of several components of argumentative complexity. Kuhn (1991) identified several components of argumentative complexity through the content analysis of 160 interviews taken from people across four age groups (teens, 20s, 40s, 60s) which asked respondents to argue for their position on social problems such as crime, failure in school, and unemployment. In addition to identifying several concepts related to the respondents' cognitive complexity, the analyses revealed six components particular to argumentative complexity: causal theories, evidence, alternative causal theories, alternative evidence, counterargument, and rebuttal.

Causal theories are chains of premises that proceed logically to the respondent's position on an issue. The quality of a causal theory, according to Kuhn (1991) is based on the length of the causal theory judged by the number of premises in the causal theory and the amount of integration between parallel causal theories. For example, it is possible that a respondent could have multiple chains of premises leading to the same conclusion. The extent to which the multiple chains share premises is equivalent to the amount of integration. The more premises in the chain and the greater the amount of integration between chains was found by Kuhn (1991) and Campo (1999) to be indicative of greater argumentative complexity. Alternative causal theories can be described in a similar fashion except that the respondent's alternative causal theories argue for a position on an issue opposing their own.

The third component of argumentative complexity is the evidence respondents provided to justify their position on an issue. Kuhn (1991) categorized evidence based on strength into three forms: genuine evidence, pseudoevidence, and nonevidence. Genuine evidence, being the strongest of the three forms, is true evidence which can stand alone from the respondent's causal theory. For example, a respondent's statistical claim of correlation between a cause and effect would be classified as genuine evidence. Pseudoevidence is a scenario or script illustrating how an issue might occur. A respondent's anecdote for why an outcome occurred would be classified as pseudoevidence. Finally, the weakest form of evidence according to Kuhn (1991) is nonevidence. A respondent provides nonevidence when it is implied that evidence is not necessary for the position taken or the position itself is claimed as evidence in a circular manner. The greater the amount of genuine evidence and pseudoevidence to nonevidence given by the respondent is indicative of greater argumentative complexity according to Kuhn (1991). Alternative evidence is defined by the same categories only the evidence is provided as justification for a position on an issue opposing one's own.

The final two components identified by Kuhn (1991) are counterarguments and rebuttals. Counterargument is the respondent's ability to generate conditions that falsify the reasons for why they hold their position on an issue. The strength of a respondent's counterarguments is the extent to which the counterarguments provided falsify the respondent's own reasons for their position on an issue. Rebuttals on the other hand are the respondent's attempt to rebuff counterarguments and alternative causal theories opposing their position. To the extent that the rebuttal argues against opposing positions

by integrating the respondent's causal theory, evidence, and counterargument the rebuttal is said to be strong.

Kuhn (1991) argues that these six components are unidimensional. Therefore, it is hypothesized that as the degree to which these six components were present in the subject's interview responses increased, so did the argumentative complexity of the response. Argumentative complexity is thought to be related to persuasiveness because research has found that people presenting more complex arguments are not only more persuasive, but also perceived by others as more competent persuaders (Campo, 1999; Kuhn, 1991; Shestowsky, Wegner, and Fabrigar, 1998). Therefore, it was expected that persuasiveness scores would correlate positively with the argumentative complexity of the subject's interview responses.

*Interview Coding.* The audio tapes from all of the interviews were transcribed by the researcher. Following transcription, three interview coders who were blind to the study's hypotheses were trained. Training occurred over several steps. First, over several sessions coders read and discussed the parts of Kuhn's (1991) text relevant to defining the six components of argumentative complexity. Once definitional agreement among the researcher and coders was achieved, focus turned to developing the coders' ability to identify the components of argumentative complexity in the interview transcripts with a high degree of intercoder reliability. Interviews were coded employing the code sheet presented in Appendix R. Referring to the definitions of each component provided by Kuhn (1991), coders were instructed to code each interview for the components of argumentative complexity using eight point Likert response scales.

Several interview transcripts not included in the study's sample were used for training. Initially, training interview transcripts were coded collectively and coders, along with the researcher, discussed any coding discrepancies until agreement was reached. Then, working independently, the remaining training transcripts were coded. When discrepancies were found between coders, a discussion was held where coders offered their perspective until agreement was reached. Substantial intercoder reliability for each of the components in the training interview transcripts was achieved (*Ebel's Coefficient* (*E.C.*)[3] > .85) and coders began coding the Study 3 interviews.

*Results*

*Measurement Models.* The three factor connector, persuader, and healthy lifestyle maven measurement model was tested with Hunter and Hamilton's (1992) method of CFA. This analysis revealed that there were no items in the model exhibiting misfit and it was concluded that the data fit the model well. Specifically, all factor loadings were above .62, only two residuals were not within sampling error of zero (eight would be expected due to chance when $p < .05$), and *RMSE* = .12, well within sampling error of zero. Table 9 presents the factor loadings and factor correlations.

Table 9

*Study 3 Factor Loadings and Factor Correlation Matrix*

| Item | Connector | Persuader | Maven |
|---|---|---|---|
| Connector 1 | 0.69 | 0.21 | -0.09 |
| Connector 2 | 0.88 | 0.48 | 0.01 |
| Connector 3 | 0.77 | 0.19 | 0.08 |
| Connector 4 | 0.92 | 0.29 | -0.12 |
| Connector 5 | 0.83 | 0.31 | 0.03 |

[3] *E.C.* is a measure of inter-coder reliability with a range of 0 to 1 and is equivalent to *S.I.* $\alpha$.

Table 9 (cont'd)

| Item | Connector | Persuader | Maven |
|---|---|---|---|
| Persuader 1 | 0.26 | 0.72 | -0.06 |
| Persuader 2 | 0.17 | 0.62 | 0.00 |
| Persuader 3 | 0.21 | 0.81 | -0.05 |
| Persuader 4 | 0.35 | 0.89 | 0.01 |
| Persuader 5 | 0.37 | 0.79 | 0.06 |
| Persuader 6 | 0.48 | 0.70 | 0.17 |
| Persuader 7 | 0.08 | 0.74 | 0.34 |
| Persuader 8 | 0.25 | 0.72 | 0.18 |
| Maven 1 | -0.06 | 0.19 | 0.83 |
| Maven 2 | -0.17 | -0.07 | 0.73 |
| Maven 3 | -0.09 | 0.10 | 0.89 |
| Maven 4 | -0.04 | -0.02 | 0.74 |
| Maven 5 | -0.08 | 0.15 | 0.86 |
| Maven 6 | 0.32 | 0.17 | 0.71 |

| Factor | | |
|---|---|---|
| Connector | | |
| Persuader | 0.36 | |
| Maven | -0.03 | 0.11 |

*Notes.* Maven = Healthy Lifestyle Maven, n = 35

Forming connector, persuader, and healthy lifestyle maven indices by taking the mean response across all items on each factor produced measures with descriptive statistics comparable to those observed in Study 2. Connector scores were distributed approximately normally, ranging from 8.60 to 84.00 with a mean of 46.09 ($s$ = 21.84). The reliability of this index estimated by $\alpha$ = .91 and *S.I.* $\alpha$ = .91. The persuader index ranged from 33.13 to 87.50. The distribution of persuader scores also approximated normality, $M$ = 63.21, $s$ = 13.82, $\alpha$ = .91, *S.I.* $\alpha$ = .91. The distribution of the healthy lifestyle maven index, ranging from 19.17 to 91.67, approached normality. The mean of

the healthy lifestyle maven index equaled 50.33 ($s$ = 22.10). The $\alpha$ reliability of the measure equaled .91 and its *S.I.* $\alpha$ reliability equaled .91.

Phonebook test scores were calculated by summing the number of affirmative responses on the test items to obtain the total names shared with the respondents' acquaintances. These scores were approximately normally distributed. The phonebook test scores ranged from 9 through 70 and the distribution had a mean of 31.46 ($s$ = 14.21).

The intercoder reliabilities of the six argumentative complexity components were examined before forming the second-order argumentative complexity index. Each coder was treated as one item on a three item measure. Thus, for each of the six components of causal theory, evidence, alternative causal theory, alternative evidence, counterargument, and rebuttal there were three items measuring the extent to which the construct was present in the subjects' interviews. Six indices were created by taking the mean of the combination of coders' with the greatest intercoder agreement on each component.

Scores on the causal theory index (coders: 1, 2, and 3) were distributed approximately normal, ranged from 2.00 to 6.67, and had a mean of 3.99 ($s$ = 1.14). The intercoder reliability of the index was estimated at .89 using *E.C.*. The evidence index (coders: 1, 2, and 3) ranged from 2.33 to 6.33 and was also distributed approximately normal. The mean of this index was 4.17 with a standard deviation of 1.19. The intercoder reliability, estimated by *E.C.* = .84. The distribution of the alternative causal theory index (coders: 2 and 3), ranging from 1.00 to 6.00, approximated normality as well, $M$ = 3.90, $s$ = 1.16, *E.C.* = .80. The distribution of scores approached normality on the alternative evidence index (coders: 1, 2, and 3). The alternative evidence index ranged from 1.00 to 4.67, had a mean of 2.90 ($s$ = .87), and *E.C.* = .71. The counterargument

index (coders: 1 and 2) was approximately normally distributed and ranged from 1.00 to 5.00. The mean response of the index was 2.46 ($s$ = 1.01), *E.C.* = .83. The distribution of the rebuttal index (coders: 1 and 2) approached normality (Range = 1.50 – 7.50), $M$ = 4.07, $s$ = 1.48, *E.C.* = .80.

CFA was not employed to test the fit of the first-order, six factor measurement model because the internal consistency matrices of each factor were underidentified. Based on visual examination of the correlation matrices, however, each index was likely first-order unidimensional. Therefore, the internal consistency of the second-order unidimensional measurement model, positing that the six first-order factors are functions of argumentative complexity was tested using CFA (Hunter & Hamilton, 1992). Initial examination of the second-order correlation matrix revealed that both evidence and alternative evidence did not exhibit internal consistency with the other components. Therefore, evidence and alternative evidence were discarded from the model.

Subsequent to removing the two misfitting components, CFA was employed to test the second-order unidimensionality of the causal theory, alternative causal theory, counterargument, and rebuttal components. The analysis revealed that all factor loadings were above .48, all residuals were within sampling error of zero, and *RMSE* = .11, well within sampling error of zero. Table 10 presents the factor loadings. Given the fit of the second-order model, the mean score across each of these four components was computed to form an argumentative complexity index. The argumentative complexity index, which was approximately normally distributed, ranged from 1.50 to 5.04. The mean of the index equaled 3.60 ($s$ = .89), *S.I.* $\alpha$ = .73. Appendix S presents three examples of interviews coded as low, moderate, and high argumentative complexity.

Table 10

*Study 3 Argumentative Complexity Second-Order Factor Loadings*

| Component | Arg Complexity |
|---|---|
| Causal Theory | 0.65 |
| Alternative Causal Theory | 0.48 |
| Counterargument | 0.66 |
| Rebuttal | 0.77 |

*Notes.* Arg = Argumentative, n = 35

Responses on the healthy lifestyle knowledge test were examined to assess the extent to which they fit a unidimensional measurement model using Hunter and Hamilton's (1992) method of CFA. There were several items in the model exhibiting misfit which were removed from subsequent analysis. CFA conducted on the remaining items produced a model that fit the data well. All factor loadings were above .33, all residuals were within sampling error of zero, and *RMSE* = .08, well within sampling error of zero. Table 11 presents the factor loadings.

Table 11

*Study 3 Healthy Lifestyle Knowledge Factor Loadings*

| Item | Health |
|---|---|
| Health 2 | 0.53 |
| Health 6 | 0.46 |
| Health 11 | 0.37 |
| Health 12 | 0.33 |
| Health 14 | 0.57 |
| Health 15 | 0.49 |
| Health 17 | 0.36 |

*Notes.* Health = Healthy Lifestyle Knowledge, n = 35

The retained items (healthy lifestyle knowledge: 2, 6, 11, 12, 14, 15, and 17) were formed into an index by summing the number of items answered correctly. The resultant

distribution of the healthy lifestyle knowledge index was distributed approximately normal with a mean score of 4.40 ($s$ = 1.85). The reliability of the healthy lifestyle knowledge index equaled .63 estimated by $\alpha$ and *S.I.* $\alpha$. Table 12 presents a summary of the indices descriptive statistics.

Table 12

*Study 3 Measure Descriptives*

| Measure | *M* | *s* | *Min - Max* | $\alpha$ | *S.I.* $\alpha$ | *Skewness* | *Kurtosis* |
|---|---|---|---|---|---|---|---|
| Connector | 46.09 | 21.84 | 8.00 - 84.00 | 0.91 | 0.91 | 0.18 | -0.94 |
| Persuader | 63.21 | 13.82 | 33.13 - 87.50 | 0.91 | 0.91 | 0.01 | -0.69 |
| Maven | 50.33 | 22.10 | 19.17 - 91.67 | 0.91 | 0.91 | 0.20 | -1.17 |
| Phone | 31.46 | 14.21 | 9.00 - 70.00 | [1] | [1] | 0.74 | 0.43 |
| Argue | 3.60 | 0.89 | 1.50 - 5.04 | 0.73[2] | 0.73[2] | -0.39 | -0.49 |
| Health | 4.40 | 1.85 | 1.00 - 7.00 | 0.63 | 0.63 | -0.31 | -0.91 |

*Notes.* Maven = Healthy Lifestyle Maven, Phone = Phonebook Test, Argue = Argumentative Complexity, Health = Healthy Lifestyle Knowledge Test, [1] computation of a reliability coefficient was not possible for this measure, [2] intercoder reliability estimated with Ebel's Coefficient, n = 35

*Predictive Validity.* The bivariate scatterplots of each superdiffuser construct and its corresponding predictive validity test are presented in Figure 9. From a cursory observation it is apparent that the data in all three scatterplots demonstrate positive trends. The scatterplots, however, also suggest that there are several data points carrying substantial influence. Because of the small sample size in Study 3 the correlation coefficient including these points would reflect the influence of the atypical case rather than the general trend in the data. Given that the goal of this study is to provide an accurate image of the conceptual relationships between the connector, persuader, and healthy lifestyle maven constructs and their predictive validity criteria, extremely influential cases were removed from subsequent analyses.

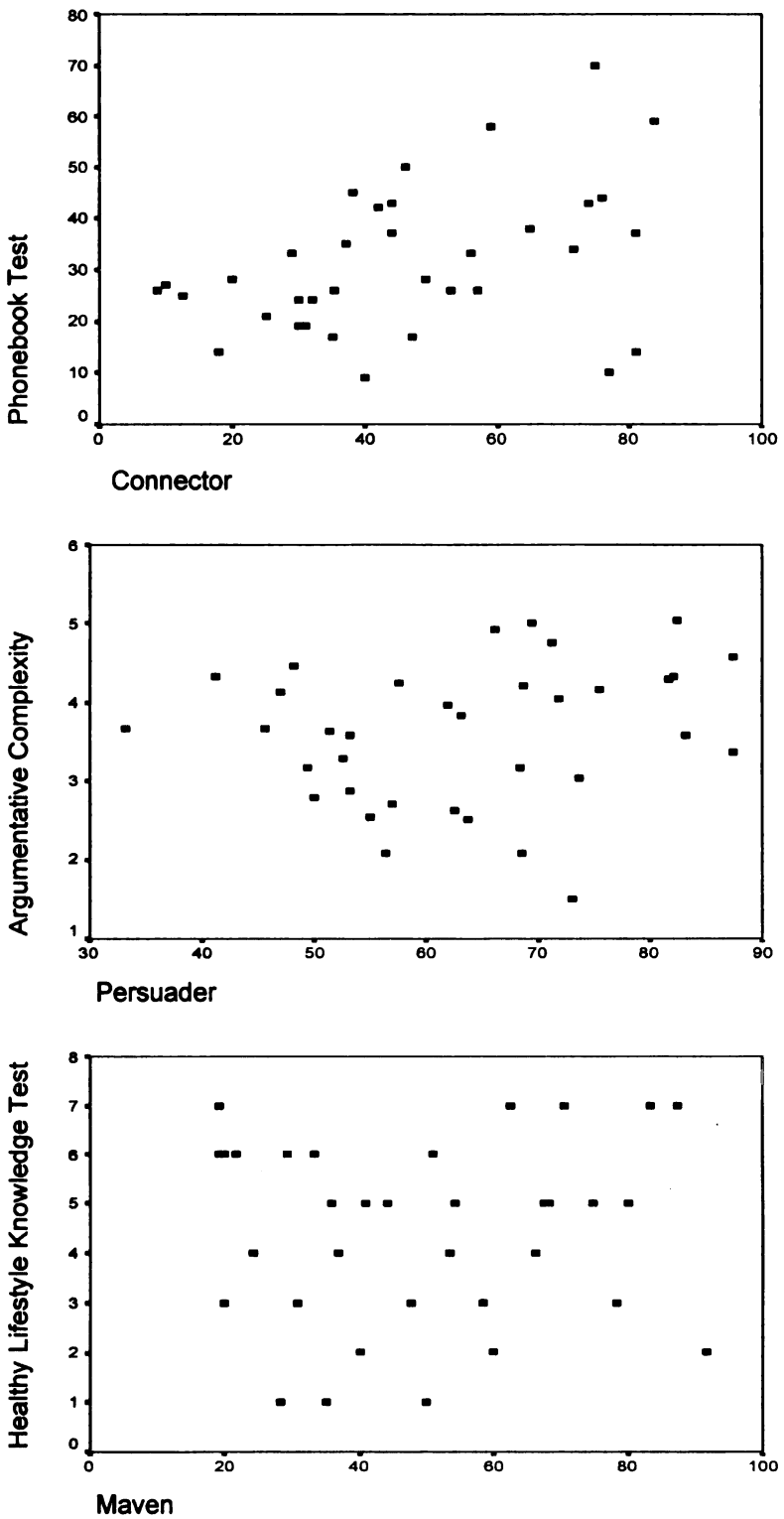


*Figure 9.* Predictive validity scatterplots.

*Notes.* Maven = Healthy Lifestyle Maven, n = 35

Cook's *D* was employed as a measure of influence. Three cases in the bivariate connector by phonebook test distribution (75.00, 70.00), (77.00, 10.00), and (81.00, 14.00) were identified as highly influential. Each of these three cases had values of Cook's *D* greater than 3.5 standard deviations above the mean. One case in the bivariate persuader by argumentative complexity distribution (73.13, 1.50) was identified as highly influential. The value of Cook's *D* for this case was greater than 4 standard deviations above the mean. Finally, one case in the bivariate healthy lifestyle maven by healthy lifestyle knowledge test distribution (91.67, 2.00) was considered influential. Cook's *D* for this case was 5 standard deviations above the mean. In each of these cases there was a substantial gap before reaching the case with the next lowest Cook's *D* value.

The predictive validity factor correlations are presented in Table 13.[4] The matrix below the diagonal contains correlations excluding influential cases and the portion above the diagonal contains correlations including influential cases.

Table 13

*Study 3 Predictive Validity Correlations*

| | Connector | Persuader | Maven | Phone | Argue | Health |
|---|---|---|---|---|---|---|
| Connector | | 0.37 | -0.02 | 0.43 | 0.45 | 0.38 |
| Persuader | 0.18 | | 0.11 | 0.08 | 0.23 | 0.00 |
| Maven | -0.08 | 0.11 | | 0.31 | 0.38 | 0.04 |
| Phone | 0.55 | 0.16 | 0.04 | | 0.36 | 0.11 |
| Argue | 0.30 | 0.29 | 0.37 | 0.12 | | 0.07 |
| Health | 0.48 | 0.01 | 0.24 | 0.30 | 0.16 | |

*Notes.* Maven = Healthy Lifestyle Maven, Phone = Phonebook Test, Argue = Argumentative Complexity, Health = Healthy Lifestyle Knowledge Test, matrix contains correlations corrected for attenuation due to measurement error, n = 30 under the diagonal, n = 35 above the diagonal

[4] It is acknowledged that all five cases identified as influential are unlikely to truly be outliers. Given the particularly small sample size and the substantial likelihood of sampling error, however, it was decided to present the data in Table 13 inclusive and exclusive of the cases identified as influential.

The predictive validity evidence for the connector measure was convincing. The connector measure correlated most strongly with the phonebook test and the phonebook test correlated most strongly with the connector measure, $r' = .55$, P ($.26 \leq \rho' \leq .84$) = .95. The connector measure also correlated amply, albeit within sampling error of zero, with argumentative complexity, $r' = .30$, P ($-.15 \leq \rho' \leq .75$) = .95. This relationship would be expected given that Kuhn (1991) and Campo (1999) both provided evidence indicating that argumentative complexity was in part skill; indeed, a skill that would be more easily developed in people who were more likely to interact with others.

The predictive validity evidence for the persuader and healthy lifestyle maven measures were not as clear. Although argumentative complexity did not correlate most strongly with the persuader measure, the persuader measure correlated most strongly with argumentative complexity, $r' = .29$, P ($-.15 \leq \rho' \leq .74$) = .95. Therefore, there was some evidence in these data for the predictive validity of the persuader measure. The healthy lifestyle maven measure actually correlated most strongly with argumentative complexity, $r' = .37$, P ($-.05 \leq \rho' \leq .79$) = .95. Both of these correlations were, however, within sampling error of zero. Given that the argumentative complexity interview involved the health topic of dieting, however, one might have expected healthy lifestyle mavens to demonstrate greater argumentative complexity on this topic than non-mavens. Additionally, even though the healthy lifestyle maven measure's correlation with the healthy lifestyle knowledge test was not particularly ample, $r' = .24$, P ($-.15 \leq \rho' \leq .78$) = .95, it was greater than the persuader by healthy lifestyle knowledge correlation, $r' = .01$. Consequently there was some evidence in the data for the predictive validity of the maven measure. This evidence was qualified by the fact that the healthy lifestyle

knowledge test may have been somewhat problematic given its weak psychometric properties and the substantial correlation between it and the connector measure, $r' = .48$, $P(.05 \leq \rho' \leq .90) = .95$.

Finally, as in studies 1 and 2, quantifying superdiffusers as people responding at least one standard deviation above the mean on the connector, persuader, and maven measures revealed that 13% of this study's sample was superdiffusers. Although this percentage was a substantial increase from previous studies, given the small sample size in Study 3 the stability of this statistic along with the other results must be assessed cautiously.

*Discussion*

Study 3 provided evidence both consistent and inconsistent with the position that scores on the connector, persuader, and healthy lifestyle maven measures have some power to predict actual behaviors associated with the psychological characteristics that each measure assesses. Specifically, scores on the connector measure predicted the number of acquaintances the respondent reported having. To a lesser extent,scores on the persuader measure predicted the respondent's argumentative complexity and scores on the healthy lifestyle maven measure predicted the respondent's healthy lifestyle knowledge. In addition to these relationships, other relationships were observed which were not predicted but not entirely unexpected. For example, the relationship between argumentative complexity and the connector measure as well as the relationship between argumentative complexity and the healthy lifestyle maven measure were two of these relationships.

Consequently, the Study 3 findings must be interpreted with caution. The small sample size limits the confidence one can have in the stability of these findings. In addition to the sample limitations, there was also a measurement limitation. The healthy lifestyle maven measure in particular needs to be subjected to a stronger test of predictive validity. The psychometric evidence for the healthy lifestyle knowledge test ($\alpha$ = .65) was the weakest of the predictive validity criterion. This weakness made it particularly difficult to interpret the predictive validity correlation matrix concerning the healthy lifestyle knowledge test.

These limitations aside, considering the fact that connectedness is much more than just how many people you know (the location of the people within the larger social network is also important), the persuader construct is much more than one's ability to generate complex arguments (the ability of the persuader to adapt their argument to the target is also important), and the healthy lifestyle maven construct is much more than general content knowledge (the ability to find and interpret the knowledge is central to the construct) the observed predictive validity correlations were acceptable (connector by phonebook test = .55, persuader by argumentative complexity .29, and healthy lifestyle maven by healthy lifestyle knowledge test = .24).

Given this mixed evidence, Study 3 could be improved by identifying better measures of the behavioral criteria and/or considering other predictive validity criteria that tap into features of the connector, persuader, and healthy lifestyle maven constructs. For example, the connector evidence could be improved by comparing the results of a network analysis against the responses on the connector measure. The persuader evidence could be improved by obtaining argumentative complexity scores across several different

topics instead of just dieting. The healthy lifestyle maven evidence could be improved by ensuring better correspondence between the breadth of the knowledge measure and the breadth of the healthy lifestyle maven content domain as well as improving the measure of healthy lifestyle knowledge, possibly within the domain of health literacy (Rothschild, 2005). Finally, there is the critique that respondents may not be able to self-report accurately on their levels of the superdiffuser characteristics. Therefore, a comparison of self-report scores obtained with these measures against other-report scores could also provide useful predictive validity evidence.

# GENERAL DISCUSSION

These three studies demonstrate evidence consistent with the validity and reliability of three individual difference measures of interpersonal persuasive efficacy. Connectors easily form acquaintances with others and consequently serve as weak-tie bridges with members of other groups. Persuaders are target adaptive debaters without being aggressive or overbearing and enjoy attempting to influence others to take positions they hold. Mavens are subject matter experts and are recognized as such, being sought out for information from others in their social network. People possessing substantial amounts of all three of these characteristics are classified as superdiffusers. Data across these studies indicated that an average of 3.6% of the respondents reported being well connected, convincing, healthy lifestyle expert superdiffusers. The ability to identify superdiffusers would be a particular boon to persuasive campaigns. Given the unique characteristics of the superdiffuser, it is likely that their influence spreads virally throughout the interpersonal social network. Therefore, not only are superdiffusers able to spread information quickly through a social network, they are also able to do so effectively because of the interpersonal mode of communication.

The uniqueness of the superdiffuser also distinguishes it from other conceptualizations of the influential. In particular, measures of opinion leadership and activism which typically focus on the expertise of the influencer were demonstrated in Studies 1 and 2 to be substantially predicted by only the maven measure. According to the CFA of the measurement models, however, it is clear that the healthy lifestyle maven construct is distinct from opinion leadership and activism. Furthermore, the connector and persuader constructs, either as direct effects or non-additively, contribute little to the

predictability of opinion leadership and activism. Therefore, given that current conceptualizations of the influential overlap largely with the maven construct and overlook connectedness and persuasiveness it is expected that employment of the superdiffuser concept will allow for more precise delineation of influentials from non-influentials than is possible with opinion leadership or activism. Consequently, viewing influentials as unidimensional may be misleading. Rather viewing influentials as a non-additive combination of the connector, persuader, and maven constructs may be more useful because different types of people fill different and important network functions.

The promises of these contributions are only as good as the quality of the connector, persuader, and maven measures, however. Therefore, the three studies conducted aimed to make fundamental improvements to the psychometric properties of the measures. Study 1 found content validity evidence consistent with the conclusion that the connector, persuader, and healthy lifestyle maven measures are three distinct, internally consistent and parallel measures. The reliabilities of these measures were also improved through adding additional items to the original measures developed by Boster et al. (2006). The measures improved from a mean level of *S.I.* $\alpha = .84$ as observed in the original measure development studies, to *S.I.* $\alpha = .91$.

This content validity evidence was replicated in Study 2 and sets of items for each measure emerged that have been consistently parallel and internally consistent. Therefore, a five item connector measure (items: 2, 3, 4, 6, and 9), an eight item persuader measure (items: 1, 3, 4, 5, 6, 7, 9, and 10), and a six item healthy lifestyle maven measure (items: 4, 5, 6, 8, 9, and 10) were identified. Study 2 further increased the mean reliability of these measures to *S.I.* $\alpha = .92$ by employing a direct interval-

estimation scaling format. Furthermore, although multiple groups CFA demonstrated that the scaling format did not alter the measures' factor structures, the direct interval-estimation format served to sensitize the upper end of the scale to allow for more precise measurement of respondents with high levels of the constructs. Finally, Study 2 demonstrated construct validity evidence for the connector, persuader, and healthy lifestyle maven measures using nomological networks. The hypothesized convergent correlations were ample, the hypothesized divergent correlations were small with a few exceptions, and there were no misfits in the networks that could not be explained reasonably by revisiting theory or of such a magnitude that they could not be attributed to sampling error.

In addition to the existing content and construct validity evidence, Study 3 demonstrated some mixed evidence for the predictive validity of the connector, persuader, and healthy lifestyle maven measures. Although qualified by the small sample, Study 3 provided some evidence for the position that scores on the connector, persuader, and healthy lifestyle maven measures are predictive of behaviors that would result from the extent to which people possess each of the characteristics. The findings of studies one, two, and three taken together suggest that the connector, persuader, and healthy lifestyle maven items form three highly reliable measures that exhibit characteristics of content, construct, and predictive validity. This result has the potential to enhance studies of social influence by refining conceptualizations of the influential and allowing these superdiffusers to be identified efficiently, without costly and complex sociometric methods or observational studies.

Although this series of studies makes these contributions, it also raises several questions that subsequent research must address. One immediate question is whether the validity evidence presented here would generalize to other samples. Although the connector, persuader, and maven constructs are hypothesized to be basic processes. These studies reliance on the student sample leaves the answer to this proposition unknown. Student populations have some unique psychographic and demographic characteristics which may impact the generalizability of the findings of these studies. Psychographically, in an older population, the skill component of the persuader and motivation component of the argumentative might be more highly converged than in the college student which could lead to different factor correlations. College students might have higher levels of certain personality characteristics than the general population. If these personality characteristics were akin to self-monitoring or narcissism, for example, it may make their responses more likely to be tainted with social desirability biases than other populations. Alternatively, the college student's youth may make it more difficult for them to report accurately their levels of the superdiffuser constructs because of less practice with introspection than an older population.

Demograhically, college environments may also have some unusual social network and group identification properties such as salient institutionalized ingroup-outgroup categorizations which are highly intertwined. Consequently, a different pattern of results might be obtained with a non-student sample. For example, the extent to which someone is well connected might be considered most important in the influence process whereas the persuader and maven constructs take second stage for some groups. For other groups the extent to which someone is a health maven might carry more persuasive

weight than their connectedness or persuader characteristics. As a result, different groups may assign more importance to some of the superdiffuser constructs than others and consequently the inter-construct correlations might vary. Therefore, although items on the measures are expected to be interpreted in the same way by different demographic and psychographic groups, there are several limitations with the use of the student sample which must be addressed in future research. In addition to considering the performance of these measures across different populations, it will be important in the future to investigate the best way to norm the measures and move away from using standard deviations for the superdiffuser classification.

This research also raises questions about the extent to which the maven concept can extend to other content domains. In these three studies, the maven construct was measured as healthy lifestyle mavenism. Based on the conceptual definition of the maven it is expected that the concept can indeed transcend content domain. There is also some evidence from the marketing literature on market mavens (Feick & Price, 1987) which approximates the idea of the maven in this line of research adding some credibility to the theoretical claims about the generality of the maven concept made here. When examining the generality of the maven in other content domains, however, it will be important to consider the breadth of the domain so that there remains conceptual distinction between mavens and opinion leaders. When investigating these possibilities it will be important to consider whether the maven construct can be measured in other content domains by modifying the existing healthy lifestyle maven items and exchanging the health reference for the desired content domain or if the development of items unique to the content domain would be necessary.

Another area of interest is the persuasive efficacy of those identified as superdiffusers. Thus far, superdiffusers have been discussed as though they are effective influencers. Although there is theoretical and empirical evidence to suggest that people who are highly connected or persuasive or expert make effective influencers, the evidence provided, however, has not tested the effectiveness of people who possess all three characteristics simultaneously. As a result it is unclear whether a person would have to exhibit high levels of all three constructs or if some of the constructs are not necessary to be influential. Consequently, it is also important for future research to identify superdiffusers, enlist their cooperation, and conduct experiments comparing the persuasive ability of the superdiffuser against the non-superdiffuser. In addition to this test, it is also important to consider the effectiveness of the communication campaign employing superdiffusers against more traditional communication campaigns.

What also remains to be addressed is how many superdiffusers are necessary to include in a communication campaign before their collective effectiveness is seen in terms of persuasive outcomes. What is also important is not just the number of superdiffusers but also how they are deployed. It may be the case that an initial wave of superdiffusers may be used to initiate change, however, the strategic placement of a second wave of superdiffusers that serve as amplifiers may be necessary to maintain the change. Gladwell (2002) discusses some research addressing this question, including the diffusion of innovations, investigating the proportion of a population that must adopt a position before acceptance of the position sweeps through the rest of the population. It is possible that the use of superdiffusers could reduce the critical mass that is needed to sweep a position through the population of interest. If it is the case that the use of

superdiffusers can reduce the number of opinion leaders needed before change sweeps a population then considerable resources could be saved.

The experiments necessary to investigate the persuasive efficacy employing superdiffusers in communication campaigns requires that some preliminary information be uncovered first. In particular, in order to recruit superdiffusers to work for a campaign it is important to know what messages will influence them to accept the position. Although it is possible that some superdiffusers will advocate the desired position by default, it may be necessary to gain the conformity of some. Therefore, it would be important to know if there are some messages that would be particularly influential for superdiffusers. Given their desire to be socially connected it could be the case that messages employing social norms would be particularly effective at influencing the superdiffuser. Also, given their desire for expertise, evidence based messages could also be particularly effective. These possibilities and others remain to be investigated in future research.

Future research would also be well served to determine if people who are superdiffusers employ a set of persuasive appeals unique to their classification. If highly connected, persuasive, content domain experts do indeed employ certain messages to their targets it might be possible to train non-superdiffusers to use those message types and obtain persuasive outcomes similar to those that might be observed if true superdiffers were used. In other words, it might be the case that an influence agent only needs to have the influence target perceive that they have the qualities of the superdiffuser to obtain the desired persuasive outcome. What is particularly interesting

from a communication perspective is that perceptions of all three characteristics of the superdiffuser could be created through simple verbal or nonverbal messages.

It seems clear that the lines of research arising from this instrument development have the potential to make interesting and important contributions to the social influence literature. It also seems clear that the store of validity and reliability evidence for these measures is accumulating. The validity and reliability assessment of measures are, however, never complete. Examining the validity of the connector, persuader, and maven measures through other-report versus self-report would provide additional evidence and test whether people are able to identify these characteristics in others. The multi-trait multi-method approach (Campbell & Fiske, 1959) could also be used to provide additional validity evidence for these measures as well. In the main, however, it is the aim of this research to instigate more research into the characteristics of a specific category of influentials, the superdiffuser.

# APPENDICIES

APPENDIX A

*Category Scaling Instructions*

Instructions: *Please read carefully each of the following statements. After reading each statement, indicate the extent to which you agree with the statement by placing an X clearly inside the box which represents how you feel. Please refer to the following example before proceeding. If you have any questions please ask the researcher. Thank you.*

---

Example:

I try to avoid attacking the self-concept of others when debating an issue.

| Disagree Strongly | | | | | | | Agree Strongly |
|---|---|---|---|---|---|---|---|
| | | | | X | | | |
| | Disagree | | Neutral | | Agree | | |

I enjoy a warm tub bath.

| Disagree Strongly | | | | | | | Agree Strongly |
|---|---|---|---|---|---|---|---|
| | X | | | | | | |
| | Disagree | | Neutral | | Agree | | |

It may be considered old-fashioned by some, but having a decent, respectable appearance is still the mark of a gentleman and, especially, a lady.

| Disagree Strongly | | | | | | | Agree Strongly |
|---|---|---|---|---|---|---|---|
| | | | | | | X | |
| | Disagree | | Neutral | | Agree | | |

---

# APPENDIX B

*Demographic Items*

1. What is your sex?

   _____

2. What is your age?

   _____

3. What year in school are you?

   _____

4. Have you ever held a position of leadership in a group, club, association, or team?

   _____

APPENDIX C

*Connector Items*

1. I make friends quickly when I start a new job, class, or join a new church.
2. I'm often the link between friends in different groups.
3. I often find myself introducing people to each other.
4. I try to bring people I know together when I think they would find each other interesting.
5. I maintain friendly, yet casual connections with most people I meet.
6. I frequently find that I am the connection between people who would not otherwise know one another.
7. People would be surprised if they knew how many friends from different groups that I have.
8. I enjoy joining new groups because it means that I will have the opportunity to meet new people.
9. The people I know often know each other because of me.
10. I am frequently the only link between different groups of people that I know.

# APPENDIX D

*Persuader Items*

1. I am good at thinking of multiple ways to explain my position on an issue.
2. I don't give up easily in an argument.
3. I'm able to argue well for a position I believe in.
4. When in a discussion, I'm able to make others see my side of the issue.
5. I am able to adapt my method of argument in order to persuade someone.
6. When my approach to an argument is not working, it is easy for me to quickly come up with something new that does work.
7. I can effortlessly offer multiple perspectives on an issue that all support my position.
8. When I argue, I am able to change a person's mind without them even knowing it.
9. More often than not, I am able to convince others of my position during an argument.
10. I am skilled at using my read of others to successfully persuade them.

# APPENDIX E

*Healthy Lifestyle Maven Items*

1. I like helping people by providing them with healthy lifestyle information they find pertinent to their lives.
2. If someone asked where to find information on a healthy lifestyle, I could point him or her to a good source.
3. People ask me for information about healthy lifestyle topics.
4. My friends think of me as a good source of information when it comes to healthy lifestyle issues.
5. When I know something about a healthy lifestyle topic, I feel it is important to share that information with others.
6. I like to be aware of the most up-to-date healthy lifestyle information so I can help others by sharing when it is relevant.
7. My friends know they could come to me if they needed information about a healthy lifestyle.
8. If someone asked me about a healthy lifestyle issue that I was unsure of, I would know how to help them find the answer.
9. Being knowledgeable enough about healthy lifestyles so that I could teach someone else is important to me.
10. People often seek me out for answers when they have questions about a healthy lifestyle issue.

# APPENDIX F

*Need for Affiliation Items*

1. I like to be loyal to friends.
2. I like to participate in friendly groups.
3. I like to do things for friends.
4. I like to form new friendships.
5. I like to make as many friends as possible.
6. I like to share things with friends.
7. I like to do things with friends rather than alone.
8. I like to form strong attachments.
9. I like to write letters to friends.

# APPENDIX G

*Perspective Taking Items*

1. Before criticizing somebody, I try to imagine how I would feel if I were in their place.
2. If I am sure I'm right about something, I don't waste much time listening to other people's arguments.[R]
3. I sometimes try to understand my friends better by imagining how things look from their perspective.
4. I believe that there are two sides to every question and try to look at them both.
5. I sometimes find it difficult to see things from the "other guy's" point of view.[R]
6. I try to look at everybody's side of a discussion before I make a decision.
7. When I'm upset at someone, I usually try to "put myself in his shoes" for a while.

*Note.* Responses to items marked with an [R] were reverse coded before analysis.

# APPENDIX H

*Empathic Concern Items*

1. When I see people being taken advantage of, I feel kind of protective towards them.
2. When I see people being treated unfairly, I sometimes don't feel very much pity for them.[R]
3. I often have tender, concerned feelings for people less fortunate than me.
4. I would describe myself as a pretty soft-hearted person.
5. Sometimes I don't feel very sorry for other people when they are having problems.[R]
6. Other people's misfortunes do not usually disturb me a great deal.[R]
7. I am often quite touched by things that I see happen.

*Note.* Responses to items marked with an [R] were reverse coded before analysis.

# APPENDIX I

*Opinion Leadership Items*

1. My opinion on a healthy lifestyle seems not to count with other people.[R]
2. When they choose a healthy lifestyle, other people do not turn to me for advice.[R]
3. Other people rarely come to me for advice about choosing a healthy lifestyle.[R]
4. People that I know pick a healthy lifestyle based on what I have told them.
5. I often persuade other people to live the healthy lifestyle that I live.
6. I often influence people's opinions about a healthy lifestyle.

*Note.* Responses to items marked with an [R] were reverse coded before analysis.

## APPENDIX J

*Healthy Lifestyle Activism Items*

1. I would purchase a poster, t-shirt, etc. that endorses a healthy lifestyle.
2. I would serve as an officer in a healthy lifestyle group.
3. I would attend an informational meeting of a healthy lifestyle group.
4. I would organize a healthy lifestyle event (e.g., talk, support group, march).
5. I would campaign door-to-door for a healthy lifestyle cause.
6. I would attend a healthy lifestyle organization's regular planning meeting.
7. I would sign a petition for a healthy lifestyle cause.
8. I would donate money to a healthy lifestyle organization.
9. I would wear a t-shirt or button with a healthy lifestyle message.
10. I would participate in discussion groups designed to discuss healthy lifestyles.

APPENDIX K

*Direct Interval-Estimation Scaling Instructions*

Instructions: *Please read carefully each of the following statements. After reading each statement, think of a person who you feel exhibits none of the characteristic described by the item and assign that person 0 points. Next, think of a person who you feel is the prototype of the characteristic described by the item and assign that person 100 points. Consider these two people as endpoints of a range which includes everyone. Now, comparing yourself against the two people, using 0 as a minimum and 100 as a maximum, indicate the extent to which you exhibit the characteristic described by the item. If you feel you the extent to which you exhibit the characteristic described by the item is closer to the person that personifies the characteristic, write a number closer to 100 in the space provided. If you feel you the extent to which you exhibit the characteristic described by the item is closer to the person that exhibits none of the characteristic, write a number closer to 0 in the space provided. You may use any number between 0 and 100 to represent how you feel relative to the two comparison people: 5, 34, 71, 92, etc. Please refer to the following example before proceeding. If you have any questions please ask the researcher. Thank you.*

---

Example:

I have read the following item and have thought of a person who I feel does not try at all to avoid attacking the self concept of others when debating an issue and assigned that person 0 points. I have also thought of a person who I feel tries earnestly to avoid attacking the self concept of others when debating an issue and assigned that person 100 points. I try to avoid attacking the self-concept of others when debating an issue about one-half way between the middle of the range and the person I thought of that personifies this characteristic. Therefore, I responded with a 75 in the space provided.

I try to avoid attacking the self-concept of others when debating an issue.

_____75_____

I have read the following item and have thought of a person who I feel does not enjoy a warm tub bath at all and assigned that person 0 points. I have also thought of a person who I feel enjoys a warm tub bath very much and assigned that person 100 points. I enjoy a warm tub bath about one-half way between the middle of the range and the person I thought of that exhibits none of this characteristic. Therefore, I responded with a 25 in the space provided.

I enjoy a warm tub bath.

_____25_____

I have read the following item and have thought of a person who I feel does not believe at all that a respectable appearance is a virtue and assigned that person 0 points. I have also thought of a person who I feel believes very strongly that a respectable appearance is a virtue and assigned that person 100 points. I believe that a respectable appearance is a virtue about in the middle of the range. Therefore, I responded with a 50 in the space provided.

> It may be considered old-fashioned by some, but having a decent, respectable appearance is still the mark of a gentleman and, especially, a lady.
>
> 50

---

# APPENDIX L

*Social Anxiety Items*

1. I often feel nervous even in casual get-togethers.
2. I usually feel uncomfortable when I am in a group of people I don't know.
3. I am probably less shy in social interactions than most people.[R]
4. I seldom feel anxious in social interactions.[R]
5. I often feel nervous when calling someone I don't know very well on the telephone.
6. I usually feel relaxed around other people, even people who are quite different from myself.[R]

*Note.* Responses to items marked with an [R] were reverse coded before analysis.

# APPENDIX M

*Argumentativeness Items*

1. Arguing over controversial issues improves my intelligence.
2. I enjoy avoiding arguments.[R]
3. I enjoy a good argument over a controversial issue.
4. I enjoy defending my point of view on an issue.
5. I do not like to miss the opportunity to argue a controversial issue.
6. I consider an argument an exciting intellectual challenge.
7. I feel refreshed and satisfied after an argument on a controversial issue.

*Note.* Responses to the item marked with an [R] was reverse coded before analysis.

# APPENDIX N

*Value-Relevant Involvement Items*

1. The values that are the most important to me are what determine my stand on healthy lifestyle topics.
2. My position on healthy lifestyle topics is based on the values with which I try to conduct my life.
3. Healthy lifestyle topics are relevant to the core principles that guide my life.
4. My beliefs about how I should live my life determine my position on healthy lifestyle topics.
5. My position on healthy lifestyle topics reflects who I am.

APPENDIX O

*Argumentative Complexity Interview Protocol*

Background Information

1. Do you believe dieting, that is eating a restrictive diet, is a healthy or unhealthy practice?
2. How strongly do you hold your belief?

Causal Theory

3. For what reasons do you hold that position?
4. How do you know this supports your position?
5. Just to be sure I understand, can you explain exactly how your arguments support your position?

Evidence

6. If you were trying to convince someone else that your view is right what *evidence* [verbal emphasis] would you give to try to show this?
7. Can you be very specific, and tell me some particular facts that you could mention to try to convince the person?

Causal Theory

8. Is there anything further you could say to help show that what you are correct?

Background

9. Can you remember when you began to hold this view?
10. Can you remember what it was that led you to believe what you do?

Alternative Causal Theory

11. Suppose that someone disagreed with your view. What might *they* [verbal emphasis]

say to try to convince you that you were wrong?

Alternative Evidence

12. What evidence might this person give to try to convince you that you were wrong?

Alternative Causal Theory

13. Just to be sure I understand, can you explain exactly how they would think this would show that you were wrong?

14. In order to support their view, what arguments might this person give?

Counterargument

15. Is there any fact or evidence which, if it were true, would show your view to be wrong?

16. Could someone prove that you were wrong?

16a. *(Probe if yes)* How?

Alternative Causal Theory

17. Imagine a person like we have been talking about whose view is very different from yours – what might they say is their view?

Rebuttal

18. How would you respond? What would you say to try to convince them?

19. Just to be sure I understand, can you explain exactly how this would show the person was wrong?

20. Would you be able to prove this person wrong?

21. *(Probe if yes)* How?

22. What could you say to show that your own view is the correct one?

APPENDIX P

*Phonebook Test*

| | | | |
|---|---|---|---|
| _____ Adams | _____ Allen | _____ Anderson | _____ Austin |
| _____ Baker | _____ Bennett | _____ Brown | _____ Burgess |
| _____ Campbell | _____ Carpenter | _____ Clark | _____ Cook |
| _____ Davenport | _____ Davis | _____ Duncan | _____ Dunn |
| _____ Edwards | _____ Elliott | _____ Erickson | _____ Evans |
| _____ Farr | _____ Flynn | _____ Fox | _____ Fritz |
| _____ Garcia | _____ Gardner | _____ Green | _____ Griffin |
| _____ Hall | _____ Hamilton | _____ Hill | _____ Hunt |
| _____ Ireland | _____ Irvin | _____ Irwin | _____ Ives |
| _____ Jackson | _____ Jacobs | _____ Johnson | _____ Jones |
| _____ Kelley | _____ Kennedy | _____ Kim | _____ King |
| _____ Lawrence | _____ Lewis | _____ Liu | _____ Lyon |
| _____ Martinez | _____ McCormick | _____ Miller | _____ Murphy |
| _____ Nash | _____ Nelson | _____ Nichols | _____ Norris |
| _____ O'Neil | _____ Olson | _____ Oswald | _____ Owen |
| _____ Parker | _____ Peterson | _____ Porter | _____ Powell |
| _____ Quan | _____ Quinlan | _____ Quinn | _____ Quinney |
| _____ Randall | _____ Reed | _____ Roberts | _____ Russell |
| _____ Sanchez | _____ Schmitt | _____ Smith | _____ Stewart |
| _____ Taylor | _____ Thelen | _____ Thomas | _____ Torres |
| _____ Underwood | _____ Unsworth | _____ Upham | _____ Urban |

| | | | |
|---|---|---|---|
| _____ Vasquez | _____ Villarreal | _____ Vincent | _____ Voss |
| _____ Wagner | _____ Weber | _____ Williams | _____ Wright |
| _____ Xi | _____ Xiao | _____ Xie | _____ Xu |
| _____ Yan | _____ Yoder | _____ Young | _____ Yu |
| _____ Zacks | _____ Zhang | _____ Zimmerman | _____ Zucker |

APPENDIX Q

*Healthy Lifestyle Knowledge Test*

1. What is the leading cause of cancer death for men?

    a. prostate cancer
    b. colorectal cancer
    c. lung cancer
    d. skin cancer

2. Major signs of stroke include:

    a. sudden numbness or weakness of the face, arms, or legs
    b. sudden confusion, trouble speaking, or trouble understanding others
    c. sudden trouble seeing in one or both eyes
    d. sudden trouble walking, dizziness, or loss of balance or coordination
    e. sudden severe headache with no known cause
    f. A, C, and D
    g. all of the above

3. Colorectal cancer can be prevented by removing precancerous polyps or growths, which can be present in the colon for years before invasive cancer develops. Current guidelines recommend regular screening for all adults aged:

    a. 21 years or older
    b. 30 years or older
    c. 40 years or older
    d. 50 years or older
    e. 65 years or older

4. What is the minimum amount of moderate-intensity physical activity adults should engage in 5 or more days of the week?

    a. 20 minutes per day
    b. 30 minutes per day
    c. 60 minutes per day
    d. 90 minutes per day

5. How many servings of fruits and vegetables should be eaten daily for good health?

    a. 3-5 servings per day
    b. 4-8 servings per day
    c. 5-9 servings per day
    d. 6-10 servings per day

6. When engaging in strenuous exercise in high heat, it's important to monitor yourself and others for signs of heat stroke. Which of the following is NOT a sign of heat stroke?

    a. red, hot, and dry skin with no sweating
    b. dizziness and confusion
    c. heavy sweating
    d. nausea

7. Adults should get vaccinations to protect against preventable diseases. This statement is:

    a. true
    b. false

8. If untreated, gonorrhea can result in what health problem(s)?

    a. epididymitis
    b. higher risk of getting or transmitting HIV
    c. cancer
    d. both A and B
    e. all of the above

9. What are some of the symptoms of prostate cancer?

    a. blood in the urine
    b. the need to urinate frequently, especially at night
    c. weak or interrupted urine flow
    d. pain or burning feeling while urinating
    e. the inability to urinate
    f. constant pain in the lower back, pelvis, or upper thighs
    g. all of the above

10. What is the leading cause of death for men?

    a. stroke
    b. diabetes
    c. cancer
    d. suicide
    e. heart disease

11. Birth defects and disabilities cannot be prevented.

    a. true
    b. false

12. Cervical cancer is associated with a sexually transmitted infection.

    a. true
    b. false

13. Breast cancer is the leading cause of death in women.

    a. true
    b. false

14. Pregnant women should be screened for the bacteria group B streptococcus (group B strep) late in pregnancy to reduce the risk of passing it to their newborn.

    a. true
    b. false

15. Overweight and obese people are at increased risk for cancer.

    a. true
    b. false

16. Pregnant women should not be vaccinated because it will definitely harm the baby.

    a. true
    b. false

17. People who smoke are at an increased risk for reproductive health problems.

    a. true
    b. false

*Note.* Key: 1-C, 2-G, 3-D, 4-B, 5-C, 6-C, 7-A, 8-D, 9-G, 10-E, 11-B, 12-A, 13-B, 14-A, 15-A, 16-B, 17-A.

APPENDIX R

*Interview Code Sheet*

Causal Theory

1) This respondent's causal theory is...

| Very Simple | | Simple | | Neutral | | Complex | | Very Complex |
|---|---|---|---|---|---|---|---|---|

Evidence

1) The respondent's ability to generate evidence for their position is...

| Very Weak | | Weak | | Neutral | | Strong | | Very Strong |
|---|---|---|---|---|---|---|---|---|

Alternative Causal Theory

1) This respondent's alternative causal theory is...

| Very Simple | | Simple | | Neutral | | Complex | | Very Complex |
|---|---|---|---|---|---|---|---|---|

Alternative Evidence

1) The respondent's ability to evidence for the alternative position is...

| Very Weak | | Weak | | Neutral | | Strong | | Very Strong |
|---|---|---|---|---|---|---|---|---|

Counterargument

1) The respondent's ability to generate a counterargument to their position is...

| Very Weak | | Weak | | Neutral | | Strong | | Very Strong |
|---|---|---|---|---|---|---|---|---|

Rebuttal

1) The respondent's ability to generate a rebuttal to the alternative position is...

| Very Weak | | Weak | | Neutral | | Strong | | Very Strong |
|---|---|---|---|---|---|---|---|---|

APPENDIX S

*Argumentative Complexity Coding Examples*

*Low*

Causal Theory

For what reasons do you hold that position?

Because it is better for your body if you are eating properly and exercising

How do you know this supports your position?

I know there are a lot of pills and stuff and I don't really believe in all that I think it is better if you eat healthy and exercise so that's just what I base it on

*(Probe if necessary)* Just to be sure I understand, can you explain exactly how your arguments support your position?

No

Is there anything further you could say to help show that you are correct?

Based on what I have read in magazines that's all I can really offer

Evidence

If you were trying to convince someone else that your view is right what *evidence* [verbal emphasis] would you give to try to show this?

Just based on what I have see people try to do with dieting and I have seen what works and what doesn't people that stick with eating certain things at certain times of the day with snacks and all that and exercising regularly that's how I would convince them

*(Probe if necessary)* Can you be very specific, and tell me some particular facts that you could mention to try to convince the person?

No, I can't think of any facts

Alternative Causal Theory

Suppose that someone disagreed with your view. What might *they* [verbal emphasis] say to try to convince you that you were wrong?

I don't know

*(Probe if necessary)* Just to be sure I understand, can you explain exactly how they would think this would show that you were wrong?

I don't know, maybe their own evidence, what they think

*(Probe if necessary)* In order to support their view, what arguments might this person give?

Just that what they think is more right that what I think

*(Omit if alternative theory already is generated)* Imagine a person like we have been talking about whose view is very different from yours – what might they say is their view?

That they don't agree with dieting and that something else would be better than dieting

Alternative Evidence

What evidence might this person give to try to convince you that you were wrong?

Just that maybe pills are better or surgery or surgery might be better than dieting

Counterargument

*(Probe if not already indicated)* Is there any fact or evidence which, if it were true, would show your view to be wrong?

Perhaps but I just think it depends on the person and that they want to do to

maintain their own lifestyle

Could someone prove that you were wrong?

Yes

*(Probe if yes)* How?

Just with facts, dirty facts

Rebuttal

*(Include if no alternative theory is generated)* How would you respond? What would you say to try to convince them?

Just that I know what to be true is different from what they know and whether they could persuade me, I don't know

*(Probe if necessary)* Just to be sure I understand, can you explain exactly how this would show the person was wrong?

No

Would you be able to prove this person wrong?

Yes

*(Probe if yes)* How?

If I actually had something I could show them

*(Probe if not already indicated)* What could you say to show that your own view is the correct one?

I don't know

*Moderate*

Causal Theory

For what reasons do you hold that position?

Because if you are trying to go on a diet to lose weight or to be healthier you have to restrict your diet in some way otherwise it is not going to change so you have to lower your caloric intake in order to do that

How do you know this supports your position?

There has been scientific evidence that says when you are at a lower weight than being obese you are at less risk for diabetes heart disease and that sort of thing

*(Probe if necessary)* Just to be sure I understand, can you explain exactly how your arguments support your position?

Because I think that when you are dieting you are increasing your health and those studies support that

Is there anything further you could say to help show that you are correct?

I could redirect them to someone who could give them more information or try to convince them

Evidence

If you were trying to convince someone else that your view is right what *evidence* [verbal emphasis] would you give to try to show this?

If I knew anyone with specific examples of losing weight and it being healthy I would give them those if they had a specific topic in mind like lowering blood pressure or whatever I would direct them to a website that would do that or a doctor that could give them more information about it

*(Probe if necessary)* Can you be very specific, and tell me some particular facts that you could mention to try to convince the person?

Dieting does lower your risk for heart disease and high blood pressure

Alternative Causal Theory

Suppose that someone disagreed with your view. What might *they* [verbal emphasis] say to try to convince you that you were wrong?

They could give me specific examples of people they know where dieting didn't help them when they tried to lose weight and they still had high blood pressure they could probably try to give me information from sites that they have seen that opposes my view

Alternative Evidence

What evidence might this person give to try to convince you that you were wrong?

I don't know because I don't feel that way they could show me a number of things like a specific example that they know of

Alternative Causal Theory

*(Probe if necessary)* Just to be sure I understand, can you explain exactly how they would think this would show that you were wrong?

If they have seen examples where my theory doesn't hold then yeah, they are going to believe that it doesn't work

*(Probe if necessary)* In order to support their view, what arguments might this person give?

Just the argument that dieting can be bad for you if you are not still getting your daily fruits and vegetables it can actually hurt you more than help you in some circumstances

*(Omit if alternative theory already is generated)* Imagine a person like we have been talking about whose view is very different from yours – what might they say is their

view?

They could tell me that they believe dieting is unhealthy because I believe dieting is healthy

Counterargument

*(Probe if not already indicated)* Is there any fact or evidence which, if it were true, would show your view to be wrong?

Only if you diet in the wrong way, me I would want to do it in a healthy way but if you were to do it in an unhealthy way then yes

Could someone prove that you were wrong?

I hope not

*(Probe if yes)* How?

Not applicable

Rebuttal

*(Include if no alternative theory is generated)* How would you respond? What would you say to try to convince them?

I would tell them that it is proven when you eat less fat and more lean protein and fruits and vegetable as opposed to the opposite that you are healthier all the way around most people would see lower blood pressure, less likely to have heart disease because their arteries are not as clogged

*(Probe if necessary)* Just to be sure I understand, can you explain exactly how this would show the person was wrong?

It would tell them that they are wrong by doing tests that show their blood pressure lower they have leaner body mass

Would you be able to prove this person wrong?

I hope so

*(Probe if yes)* How?

I would show them by studies that have been done in a healthy way how it can benefit the person in both the long run and the short run

*(Probe if not already indicated)* What could you say to show that your own view is the correct one?

I think I would do the same thing I don't think I would do anything differently

*High*

Causal Theory

For what reasons do you hold that position?

Because I know so many people who eat healthy for a little while and then it all just comes right back and sometimes even more because when you stop eating a certain food or cut carbs out of your diet you'll lose a lot of weight but first of all its not very healthy and second of all when you do start to eat it again your body stores it. You jut need to learn how to control proportions

How do you know this supports your position?

I've kind of researched it, my mom is a nurse, and my friends and I discuss it all the time

*(Probe if necessary)* Just to be sure I understand, can you explain exactly how your arguments support your position?

Making your diet healthy and balanced is a better idea if you are trying to lose weight or trying to become a better person because it will decrease your weight if

that is what you are looking for or it will make it a permanent lifestyle change instead of a spur of the moment for a couple of months I am not going to eat a certain food but when you do eat it again your body will turn it straight to fat and store it like the hibernation effect when a bear hibernates it binges and turns all of the food to fat and the same thing occurs when you stop eating something when you start eating again your body stores it so when you don't have it it has it that's why dieting for a period of time is not a good idea you should have a diet that is a permanent lifestyle

Is there anything further you could say to help show that you are correct?

I probably could and it depends on the person if they are going for losing weight I could give them tips about what they should do and make sure they fit in exercise into their daily things and go over what they eat everyday to see if there are certain things they ate a lot of or less of certain things

Evidence

If you were trying to convince someone else that your view is right what *evidence* [verbal emphasis] would you give to try to show this?

I could show websites, or books, notes from biology class and physical evidence to prove it to them and then I could also show examples of friends or family members

*(Probe if necessary)* Can you be very specific, and tell me some particular facts that you could mention to try to convince the person?

Becoming healthy basically needs to be a balanced diet and when you are trying to lose weight it's a balancing act of how many calories you take in and how

many you use and if you use more calories than you are eating you are going to lose weight if you're eating more than what you are doing and that's a big deal and your diet needs to be balanced and if it is not your body will store certain things and like an example would be like if you cut carbs from your diet your body will get smaller but as soon as you start eating them you will gain that back because your body will immediately store it

Alternative Causal Theory

Suppose that someone disagreed with your view. What might *they* [verbal emphasis] say to try to convince you that you were wrong?

They might tell me the example of someone who needs to diet for health reasons probably that's how I would see it the other way around and that it is better to eat nothing than to eat bread because of the carbs in bread and I would basically be like you need that and they would try to convince me that as long as you are eating less it could be just eat a couple bites of your pizza and you are good for the day and I would keep arguing but they would keep trying to tell me that dieting is good because you'll lose weight faster

*(Probe if necessary)* Just to be sure I understand, can you explain exactly how they would think this would show that you were wrong?

It would give concrete evidence and it is easier to look at someone who just dropped 100 pounds and say that's because of a diet or they went on the Atkins or they did Weight Watchers or talk about someone who changed they lifestyle of eating and argue that their genes made them lost weight so they would suggest there is no way of proving that a lifestyle of eating right is better than dieting and

they are not going to bring up the people who gained it back after getting off their diet

*(Probe if necessary)* In order to support their view, what arguments might this person give?

People who are severely obese need to go on a diet or do something drastic in order to help them out so they don't get really sick or have something deadly happen cause some people like to eat that much like that or they could try to say that spring break is coming up and we need to diet fast and it you just change your lifestyle it will take too much time and you won't see the results

*(Omit if alternative theory already is generated)* Imagine a person like we have been talking about whose view is very different from yours – what might they say is their view?

That diets are good and losing weight it healthy

Alternative Evidence

What evidence might this person give to try to convince you that you were wrong?

They would tell me about people or themselves that have lost weight because of dieting and probably give me a lot of examples even though from my point they won't keep the weight off unless they change their lifestyle

Counterargument

*(Probe if not already indicated)* Is there any fact or evidence which, if it were true, would show your view to be wrong?

Like I said I think the only reason that would be wrong and if you call something a diet and you stay with it the rest of your life its not a diet it is a lifestyle but if

they say I am wrong in the essence that people who are so big that they can't fit through a doorway or can't roll out of bed I think that those people need to go on a diet or need to do something severe to drop the weight fast and then slowly make it a lifestyle change

Could someone prove that you were wrong?

Yes

*(Probe if yes)* How?

I think they would do that by pointing out examples about like obese people that are in the hospital that are severely obese and I think that they could try to prove me wrong by pointing out examples of people

Rebuttal

*(Include if no alternative theory is generated)* How would you respond? What would you say to try to convince them?

I would say that yes it is good to lose weight and eat healthier things but it should be a life change and it should be a permanent thing that includes exercise and it is not just what you eat for a short period of time, a life change that will last forever

*(Probe if necessary)* Just to be sure I understand, can you explain exactly how this would show the person was wrong?

I would say, have you ever seen someone who went on a diet and did really good at first and lost a ton of weight and then they ventured off of it and then all of the sudden all of the weight is back and plus some and not know why. I know several people who went on the Atkins who lost a lot of weight and then boom it came back or people that you know who went on spring break and they drop a ton of

weight right before and then they come back and it's all right back and their wearing hoodies and sweats everywhere they gained it all back when you venture off of a diet you will gain back the same if not more weight because all you did is change your diet for a short period of time which is actually bad for your body I have a friend that did Weight Watchers and she lost a ton of weight and now she has gained it all back since she went off it even though she eat pretty healthy because she restricted herself for so long because her body thought that's how it would be eating forever but it wasn't so her body decided to store everything since she went off her diet so you whould make a diet something that is a permanent lifestyle change

Would you be able to prove this person wrong?

Yes

*(Probe if yes)* How?

I could show then examples of people who have gone off their diets and how it effects you weight and motions and tell them stories and examples to convince them that way

*(Probe if not already indicated)* What could you say to show that your own view is the correct one?

Books could be helpful to go beyond the standard evidence or my word and show them here is where it is in print of take them to the gym to talk to dietitians and things like that

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# REFERENCES


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