Affiliation: A Consequential, Interstitial Trait

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**Acknowledgments**

We would like to thank the research participants, as well as Edward Chou and Muchen Xi (for their help and input). SDB was supported by a National Science Foundation Graduate Research Fellowship (grant #1348264), as well as Graduate Research Partnership Program and Auke Tellegen Personality Assessment fellowships through the University of Minnesota. Supplemental materials and relevant data/code for the paper will be posted online: https://osf.io/m8hc3/?view_only=39c830faa04f451a820300967a7e5901

Abstract

Although development and maintenance of relationships is an essential part of mental health and well-being and nearly universal among humans, people vary in their tendency to affiliate with others. *Affiliation* represents an interstitial personality trait falling between the Compassion aspect of Agreeableness and the Enthusiasm aspect of Extraversion. Though interpersonal behavior has been studied extensively, the field lacks validated questionnaires measuring individual differences in Affiliation. Here, we document the construction and validation of a new Trait Affiliation Scale. Data were taken from six samples ($n_{total}$ = 27,198). Study 1 focuses on scale creation, including identification of 24 candidate items and initial tests of convergent validity. Study 2 focuses on scale refinement including the application of item response theory to create a ten-item scale. Study 3 investigates reliability and construct validity. Study 4 provides evidence of test-retest reliability in a four-wave longitudinal dataset. Finally, Study 5 provides evidence for criterion and incremental validity, testing associations of affiliation with outcome variables (e.g., social behaviors, social network size, social cognition, and affiliative states) above and beyond Agreeableness, Extraversion, and their aspects. We discuss the importance of affiliation as a trait and provide recommendations for future research using this new scale.

*Keywords*: affiliation, personality, questionnaire, psychometrics, interpersonal, relationships

## Affiliation: A Consequential, Interstitial Trait

The ability to develop and maintain healthy close relationships is an essential part of mental health and well-being, and understanding this phenomenon better is important to psychological science. Situational factors may influence one's decision to engage in affiliative behavior, but there is also an underlying trait representing individual differences in the tendency toward affiliation. Conceptually, affiliation seems to require two distinct psychological processes: finding social interactions rewarding, but also empathizing with and caring about others (DeYoung & Weisberg, 2018). Impairments in either of these domains may result in interpersonal difficulties, as seen in various forms of psychopathology (DeYoung & Krueger, 2018; Gore & Widiger, 2013; Wright & Ringwald, 2022). Individual differences in trait affiliation can be understood through the lens of broad personality models.

### The Big Five and Social Behavior

The most prominent traits in personality psychology are the Big Five (Costa & McCrae, 1992; John et al., 2008), of which two are particularly related to social behavior and interpersonal functioning: Extraversion and Agreeableness (DeYoung et al., 2013; DeYoung & Weisberg, 2018; Jensen-Campbell et al., 2002; Koole et al., 2001). *Agreeableness* describes tendencies to be cooperative and altruistic as opposed to selfish and exploitative. *Extraversion* describes tendencies toward approach behavior, sociability, and positive emotionality. Agreeableness and Extraversion predict various interpersonal outcomes and have been linked to social cognition and reward sensitivity, respectively, which are likely to be key mechanisms for explaining these traits (Allen et al., 2017; Blain et al., 2021; Lucas et al., 2000; Nettle & Liddle, 2008; Smillie et al., 2012). Likewise, those with pathological low Extraversion or Agreeableness —conceptualized as Detachment and Antagonism, respectively—show marked impairments in

social functioning (Gore & Widiger, 2013; Holden et al., 2015; Suzuki et al., 2015; Wright & Ringwald, 2022; Wright & Simms, 2015).

Each of the Big Five can be decomposed into two major subfactors or *aspects* (DeYoung et al., 2007). The two aspects of Extraversion are Assertiveness and Enthusiasm, and the two aspects of Agreeableness are Compassion and Politeness (DeYoung et al., 2007). Assertiveness includes tendencies related to leadership, dominance, and drive, whereas Enthusiasm includes outgoing friendliness and a tendency to experience and express positive emotion. Compassion reflects empathy and caring for others, whereas Politeness reflects respect for others and a tendency to refrain from aggression. Together, Extraversion, Agreeableness, and their aspects capture many of the most important individual differences in interpersonal functioning.

Theories of personality can help us go beyond describing traits to better understand their mechanisms. Cybernetic Big Five Theory (CB5T) is a biologically grounded theory designed to explain the Big Five (DeYoung, 2015). Cybernetics is the study of principles governing goal-directed, self-regulating systems. CB5T is based on the premise that the Big Five each represent variation in universal human mechanisms that evolved to facilitate goal pursuit. CB5T has implications for understanding social behavior (DeYoung & Weisberg, 2018), particularly as it can help us understand the functions of Extraversion and Agreeableness, their component aspects, and their intersection.

All components of Extraversion can be seen as reflecting an underlying sensitivity to reward (Blain et al., 2020; Corr, 2008; DeYoung, 2015; Lucas et al., 2000; Smillie, 2013; 2019). There are two main subtypes of reward: 1) incentive rewards, which are cues that one is getting closer to achieving a goal and 2) hedonic rewards, which correspond to the enjoyment experienced once a goal is achieved (Berridge, 2007; Berridge & Robinson, 2016). These two

forms of reward can be described as "wanting" and "liking", respectively, and CB5T proposes that Extraversion and its aspects of Assertiveness and Enthusiasm are differentially related to sensitivity to these two forms of reward (DeYoung et al., 2015; DeYoung & Weisberg, 2018). Though both aspects of Extraversion are related to social functioning and incentive reward sensitivity, Enthusiasm and associated experiences of interpersonal pleasure (a form of hedonic reward) may be particularly important to close relationships.

As social mammals, humans must coordinate their goals, interpretations, and strategies, and individual differences in Agreeableness are associated with our ability and tendency to do so successfully (DeYoung et al., 2015; DeYoung & Weisberg, 2018; Graziano & Eisenberg, 1997; Graziano & Tobin, 2013; Habashi et al., 2016). Mechanisms underlying cooperation, altruism, and associated variation in Agreeableness include the ability to perceive emotions accurately and to interpret the mental states of others (Allen et al., 2017; Graziano et al., 2007; Nettle & Liddle, 2008), as well as the ability to suppress aggressive or destructive impulses (Meier et al., 2006). Though both aspects of Agreeableness are important for social functioning, Compassion—associated with the characteristics of prosociality, warmth, and nurturance—may be particularly important when it comes to close relationships.

To understand individuals' interest in and desire for close relationships as a personality trait, a combination of these previously identified traits may be helpful. Specifically, Enthusiasm and Compassion correlate strongly with one another and are both associated with tendencies to form and maintain relationships. This blend—*Trait Affiliation*—is situated halfway between the two aspects (as measured in vector space, implying equal relations to the two traits) and is easily integrated into other psychological models of interpersonal behavior, such as the Interpersonal Circumplex or IPC (Barford et al., 2015; DeYoung et al., 2013; DeYoung & Weisberg, 2018).

**The Interpersonal Circumplex**

The IPC is a widely used structural model of interpersonal traits and behaviors that is organized around two orthogonal dimensions—Status and Love (Gurtman, 2009; Leary, 1957; Wiggins, 1979). Although early interpersonal theory stemmed from the work of Harry Stack Sullivan (1953; 1964), the IPC of today emerged from the contributions of Timothy Leary (1957). The IPC is frequently visualized using a circle, and locations along the circumplex can be specified using angular projections between 0º and 360º, each representing a specific interpersonal style that can be conceptualized as a blend of low or high Status and low or high Love. Locations of variables in the IPC provide a quick way to visualize how the variables relate to each axis and to one another. Variables close together on the IPC are positively correlated, those on opposite sides are negatively correlated, and those at right angles are uncorrelated.

In addition to the two orthogonal dimensions of the IPC, additional locations on the circumplex can be specified (Figure 1). These are typically specified in degrees, with 0° representing the Love axis and values proceeding counterclockwise. The IPC is frequently discussed in terms of eight subdivisions, known as octants (e.g., Gregarious-Extraverted, Aloof-Introverted, and Unassured-Submissive), which can be defined by the high and low poles of the Status and Love axes, as well as their 45° rotations or diagonals. Various questionnaires have been created to assess how well individuals can be described by each of the octants in terms of trait tendencies or behaviors in a specific situational context (e.g., Markey & Markey, 2009).

Since the IPC and Big Five are two of the most used and influential models for understanding individual differences in personality and social behavior, substantial efforts have been taken to integrate these systems (Barford et al., 2015; DeYoung et al., 2013; Pincus, 2002). Relative to most other Big Five pairs, Extraversion and Agreeableness show a high degree of

circumplexity, meaning the aspects and facets of these traits show a consistent (rather than clustered) density of variables around the circle representing their variance in two orthogonal dimensions (Gurtman, 2009; Saucier, 1992). Consequently, facets of Extraversion and Agreeableness will sometimes group together in factor analyses, particularly when there is a disproportionately high number of markers of one domain or an imbalance of content related to the different aspects (e.g., Church & Burke, 1994). Several studies show that Extraversion and Agreeableness can be represented as rotational variants of the IPC axes, falling at 67.5° and 337.5º, respectively (Figure 1; DeYoung et al., 2013; McCrae & Costa, 1989; Pincus, 2002). Lower-order factors of Agreeableness and Extraversion, including facets and aspects, have also been mapped onto the IPC. The aspects map precisely onto the major axes of the IPC, with Compassion falling at 0º, Enthusiasm at 45º, Assertiveness at 90º, and Politeness at 315º (Barford et al., 2015; DeYoung et al., 2013). Trait affiliation appears likely to fall at 22.5º on the IPC, midway between Compassion and Enthusiasm (DeYoung et al., 2013).

**The Current Research**

One motive for more closely examining the interstitial space between Compassion and Enthusiasm (i.e., Trait Affiliation) is to better define and measure their overlap. Several current measures related to affiliation fall in the space between 0º and 45º in the IPC (DeYoung et al., 2013), including the warmth facet of Extraversion from the NEO PI-R (Costa & McCrae, 1992), the Warmth facet of Agreeableness from the IPIP (AB5C-IPIP; Goldberg, 1999), and Social Closeness from the Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008). None of these measures, however, were empirically constructed to capture a precise blend of Enthusiasm and Compassion, and they tend to fall closer to one aspect or the other. This leaves room for a new scale specifically targeting the IPC's 22.5º vector. Because of the likely

importance of trait affiliation for predicting and researching life outcomes related to interpersonal functioning and relationship success, we have developed a new self-report measure of Trait Affiliation, assessing individuals' tendencies to seek out, develop, and maintain close relationships.

Developed from an initial set of 24 candidate items taken from the International Personality Item Pool (IPIP), the final form of the Trait Affiliation Scale consists of ten items. Data for this validation effort are compiled from six samples (total $n$ = 27,198) and organized into five studies (summarized in Table 1). Study 1 focuses on item selection and scale construction. Study 2 focuses on scale refinement, including the application of item response theory to evaluate item information and create a ten-item scale from the initial 24 items. Study 3 provides evidence of internal consistency and structural, convergent, and discriminant validity for the scale's final version, in six samples. Study 4 provides evidence of test-retest reliability in a four-wave longitudinal dataset. Study 5 shows evidence of incremental validity in predicting interpersonal variables (e.g., social goals, social behaviors, social network size, social cognitive ability, and response to an emotion induction paradigm). Finally, we discuss the importance of affiliation and provide recommendations for future use of our scale.

## Study 1: Item Selection and Scale Creation

To create the Trait Affiliation Scale, we used the IPIP, which contains more than 2,500 public-domain personality items, each of which was completed by participants in the Eugene Springfield Community Sample (ESCS). Many previous efforts have used the IPIP to create new scales, based on associations of IPIP items with other questionnaires or specified criteria (e.g., DeYoung et al., 2007; Markey & Markey, 2009; Goldberg, 1999).

Using the IPIP allowed us to select items that are specifically and precisely associated with the intersection of Compassion and Enthusiasm, rather than relying on existing measures (e.g., MPQ Social Closeness or various Warmth scales) that merely approximate the content of trait affiliation and its theorized location in the IPC and Big Five factor space. Using the IPIP to create new measures has numerous other advantages, not least of which is the fact that items are in the public domain, so measures developed using the IPIP facilitate reproducibility and open science.

In Study 1, we examined associations of IPIP items with the mean of BFAS Enthusiasm and Compassion, to select items specifically tapping into trait affiliation that could both allow us to investigate the structural location of trait affiliation and serve as our initial item pool for further scale development. We then computed participants' average scores on these items and used principal axis factoring with a targeted rotation to examine where this variable falls in the factor space of the IPC and Big Five. Based on theory and previous work using a single-item marker of trait affiliation assessing whether people tend to feel affectionate toward others (DeYoung et al., 2013), we hypothesized that trait affiliation would fall near the 22.5º angle of the interpersonal circumplex, when modeled alongside a variety of other relevant variables from the Big Five and IPC.

## Method

### *Participants and procedure*

The sample used in the current study was a subsample of the ESCS dataset, with participants selected who had completed affiliation-related measures of interest (n = 409). Demographics are summarized in Table 1. Participants in the ESCS were recruited by mail and agreed to complete questionnaires, delivered by mail, for pay, over a period of years, beginning

in 1994. Measures used for the current study included 2552 items from the IPIP (Goldberg et al., 2006), the Big Five Aspect Scales (BFAS; DeYoung et al., 2007), the Big Five Inventory (BFI; John et al., 2008), the IPIP-IPC Scales (Markey & Markey, 2009), the NEO Personality Inventory-Revised (NEO PI-R; Costa & McCrae, 1992), the Abridged Big 5 Circumplex IPIP scales (AB5C-IPIP; Goldberg, 1999), and the Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008). These measures are described in further detail in our online supplement.

### *Statistical Approach*

***Item Selection.*** To select items for the Trait Affiliation Scale, we computed Pearson correlations of 2552 IPIP items with a proxy for affiliation computed by averaging Compassion and Enthusiasm, as well as examining correlations with all the individual BFAS subscales. Candidate items for the scale were selected based on the criteria of 1) having a correlation with the affiliation proxy greater than or equal to $r = .30$ in absolute value, 2) having a correlation with the affiliation proxy greater than either of the correlations with Compassion and Enthusiasm, and 3) having correlations with Compassion and Enthusiasm that were at least .10 larger than correlations with any of the other eight BFAS aspects.

***Initial Test of Construct Validity.*** To assess the validity of the resulting item pool, we computed a trait affiliation score for each participant based on the average of all candidate items and then examined how these scores were associated with other variables from the Big Five and IPC. Two items were excluded from the creation of AB5C Warmth scores due to overlap with the candidate affiliation items: I "Am interested in people" and "Make others feel good".

To examine associations with these other constructs, we followed a method designed to capture the factor space described by interpersonal theory (DeYoung et al., 2013). First, we

generated a target matrix with two factors, based on the IPC. This represented a circular structure where the positive pole of Status loaded 0 on the first factor and .8 on the second, whereas the positive pole of Love was assigned the opposite pattern (.8 was chosen instead of 1.0 to account for measurement error; no variable is likely to have a perfect loading on either factor). Other variables were assigned target loadings based on their hypothesized IPC locations; for example, trait affiliation was predicted to fall at the 22.5º angle, corresponding to loadings of .74 and .31. We then extracted two factors using principal axis factoring, applying a Procrustes rotation to align the solution to the target matrix (Schönemann, 1966). The target loading matrix is shown beside the rotated observed loadings in Table S1. Angular projections for each variable were computed as the arctangent of the quotient of each variable's pair of factor loadings.

To assess the circumplex structure of the interpersonal variables, we utilized Tucker's congruence coefficient (DeYoung et al., 2013). This method computes coefficients analogous to correlations for each variable based on the correspondence of target and observed loadings. Coefficients are the cosine of the angle between target and observed loadings (represented as vectors) and range from -1 to 1, with higher magnitude values indicating greater similarity. Coefficients greater than .95 are considered evidence of replication, whereas those greater than .85 are evidence of similarity (Lorenzo-Seva & Ten Berge, 2006).

**Results and Discussion**

***Item Selection***

The initial selection of Trait Affiliation Scale items is presented in Table 2, along with the correlations of each item with the affiliation proxy variable that was computed by averaging Compassion and Enthusiasm. (The three right-most columns in Table 2 will be discussed in Study 2.) This selection process yielded a total of 23 items. Correlations of the selected trait

affiliation candidate items with the BFAS affiliation proxy variable ranged in absolute value from .31 to .66. Complete documentation for all 2552 tested IPIP items is in Supplement B.

### *Initial Test of Construct Validity*

Target and observed (rotated) factor loadings for our pilot Trait Affiliation Scale (i.e., the average of 23 candidate items) and other variables are shown in Table S1, along with predicted and observed angular projections and Tucker's congruence coefficients. Factor loadings are visualized in Figure 2. Results for variables other than the new scale are essentially identical to those discussed in a previous article (DeYoung et al., 2013).

Given that trait affiliation items were identified using correlations with Compassion and Enthusiasm, it is no surprise that trait affiliation fell in the first quadrant of the circumplex between Enthusiasm and Compassion (23.26º) and did not significantly deviate from the hypothesized position, 22.5º. The trait affiliation variable was located further from the origin than the single item "Feel affectionate toward people" was in previous research in two other samples (DeYoung et al., 2013), reflecting higher factor loadings and higher measurement precision for a multi-item measure. Moreover, the pilot Trait Affiliation Scale matched the theorized 22.5º angle more closely than scales measuring similar constructs such as MPQ Social Closeness and the Warmth facet scales from the NEO PI-R and AB5C-IPIP (though NEO Warmth was nearly as close in its approximation of this angular position, falling at 21.49º).

## Study 2: Scale Refinement

Study 1 identified a pool of candidate trait affiliation items and showed that the mean of these items had the expected structural properties. Further refinement of the scale was conducted in an independent sample to make it shorter while optimizing measurement of the underlying latent trait. Useful statistical approaches for scale refinement include factor analytic methods

applied in the framework of classical test theory, as well as item response theory (IRT) methods that can examine how items differentially function across varying levels of a given underlying trait (De Ayala, 2009; Steinberg & Thissen, 1995).

IRT is a family of methods that model the probability of responses to an item as a function of person and item parameters. Persons are placed on latent trait (θ) continua, based on their responses to an entire scale. Items can exhibit varying levels of discrimination and difficulty. Discrimination quantifies an item's sensitivity to changes in θ; for a highly discriminating item, changes in θ sharply increase the probability of responding Agree or Strongly Agree (and vice versa for the probability of Disagree or Strongly Disagree responses) Difficulty or location parameters quantifies the level of an underlying trait that is assessed by a given item; high-difficulty items discriminate among individuals higher on the underlying trait, whereas low-difficulty items discriminate among individuals lower on the trait. In the current study, we used IRT to examine the functioning of candidate items and select an optimal group of items for discriminating amongst individuals across a range of latent trait affiliation levels.

To collect a sample large enough for effective IRT analysis, we used synthetic aperture personality assessment (SAPA). SAPA uses planned missingness to administer a selection of items from a large pool of potential items to a large sample of participants (Revelle et al., 2021). In SAPA, each participant completes a subset of the items of interest, rather than completing all of them. A total of 24 candidate items for the Affiliation Scale were administered across the current dataset of over 25 thousand participants, with each participant completing 1.44 affiliation items on average (along with other items). Covariance matrices at the inter-scale level can then be recreated using item-level correlations. The SAPA method is well-suited for assessment across multiple domains of personality and for constructing and validating new scales, by

circumventing the need to administer an impractically large quantity of items to any given participant (Condon & Revelle, 2015; Condon et al., 2017; Revelle et al., 2016).

In this study, we used SAPA data and conducted analyses to select the final items for the Trait Affiliation Scale. We also examined scale-level associations between Trait Affiliation Scale candidate items and related variables of interest (e.g., the Big Five, various personality facets, demographic characteristics, and cognitive ability).

## Method

### *Participants*

Sample 2 included 25,732 individuals who provided data through the SAPA website (https://www.sapa-project.org/). Participants completed a demographic questionnaire (see Table 2) and items from a variety of personality and cognitive ability measures. Data for the current project were collected between 9/11–10/15/2013. Measures with items included in the current study included the Trait Affiliation Scale, BFAS, IPIP-HEXACO scales (Ashton et al., 2007), and Questionnaire Bix Six scales (QB6; Thalmayer et al., 2011). Participants also completed cognitive ability items from the International Cognitive Ability Resource (ICAR; Condon & Revelle, 2014). (See our supplement for additional information on the measures.)

In addition to 23 candidate affiliation items from the IPIP introduced in Study 1, we administered the item, "Feel affectionate towards people," in Study 2. This decision was based on work showing that warmth and affection are the emotional states most associated with affiliation (Depue & Morrone-Strupinsky, 2005). We also previously found that this item closely matched the predicted 22.5º position of affiliation in relation to other Big Five and IPC variables (DeYoung et al., 2013).

### *Statistical Approach*

***Construct Validity.*** To assess the nomological net of our trait affiliation construct, we computed scale-level correlations between trait affiliation (based on our 24 candidate items) and a variety of other variables. First, the mixedCor function from the R package *psych* was used to compute item-level correlations; then, the scoreOverlap function was used to compute scale-level correlations based on the item-level correlation matrix, corrected for potential item overlap within any given pair of scales (Revelle, 2021). (Correlations based on the final version of the Affiliation Scale are presented in Study 3.)

***Scale Refinement.*** First, model-based reliability was tested using Omega (total and hierarchical). Then, IRT was used to examine item information and refine item selection, using item response analysis by exploratory factor analysis of polychoric correlations, as implemented in the *psych* package (Revelle, 2021). Loadings on a single factor, using minimum residual factoring, were transformed into item discrimination parameters. We also generated item-information plots and computed area under the item information curve for candidate items.

## Results and Discussion

### *Tests of Construct Validity*

Correlations of Affiliation with demographics are presented in Figure S1. Consistent with past research on gender-differences (Costa et al., 2001; Feingold, 1994; Weisberg et al., 2011), women tended to have higher Trait Affiliation than men ($r$ = .32). Higher Trait Affiliation was also associated with a slightly higher likelihood of being in a committed relationship ($r$ = .13). Associations with other demographic variables were negligible ($r$'s < .10).

Correlations of Affiliation with BFAS scores are shown in Figure S2. As expected, based on how the scale items were selected, Trait Affiliation was highly positively correlated with BFAS Compassion ($r$ = .79) and Enthusiasm ($r$ = .76). The next highest correlations for Trait

Affiliation were for BFAS Assertiveness ($r$ = .45) and Politeness ($r$ = .28), followed by the BFAS Openness aspect ($r$ = .27) and Withdrawal ($r$ = -.21). Scale-level correlations of Trait Affiliation with HEXACO/Big Six domains and facets are shown in Figures S3 and S4. The strongest associations at the domain level were positive associations of Trait Affiliation with Extraversion scales from the IPIP-HEXACO ($r$ = .70) and QB6 ($r$ = .78). Correlations of Trait Affiliation with Agreeableness were markedly smaller for both the IPIP-HEXACO ($r$ = .35) and QB6 ($r$ = .26), compared to Big Five Agreeableness, but this is expected because HEXACO Agreeableness is not the same trait as Big Five Agreeableness, and reflects a blend of facets from Agreeableness and Neuroticism in the Big Five (Anglim & O'connor, 2019; DeYoung, 2020; Ludeke et al., 2019). In terms of associations at the facet level, the highest correlations with Trait Affiliation were seen for IPIP-HEXACO Sociability ($r$ = .76), Liveliness ($r$ = .56), Expressivity ($r$ = .55), Social Boldness ($r$ = .52), Entitlement ($r$ = -.50), and Dependability ($r$ = .40).

Finally, scale-level correlations of Affiliation with cognitive ability, as measured by items from the ICAR, are visualized in Figure S5. Relatively small negative correlations were observed for Trait Affiliation with overall ICAR performance ($r$ = -.17) and all ICAR subscales.

***Scale Refinement***

General-factor saturation was reasonably high for the whole pool of candidate items ($\omega_h$ = .67), providing some evidence for a strong general factor among candidate items. Item information curves for the 24 Trait Affiliation Scale candidate items are presented in Figure 3 (using red curves for items in the final version of the scale). Values for each item's discrimination parameter ($a_i$) and area under the information curve (AUC) are presented in Table 2; location parameters for each item and response option are presented in Table S2. Based on these additional analyses, we refined the selection of items, narrowing down the final version of

the Trait Affiliation Scale to ten items. Items for the final version were selected to maximize item information and discrimination across levels of latent Trait Affiliation. We also removed any items that significantly reduced reliability and attempted to balance positively and negatively keyed items. The 10 items appearing in the final version of the scale are indicated in Table 2.

## Study 3: Reliability and Validity of the Final Scale Form

With the final version of the scale in place, Studies 3 through 5 focus on its reliability and validity. In Study 3, we examined internal consistency and correlations of Trait Affiliation with various other personality constructs, across several datasets. We expected to see strong positive correlations with Compassion and Enthusiasm, moderate positive correlations with other Agreeableness and Extraversion measures, and minimal correlations with the other three Big Five domains and intelligence. We also anticipated negative correlations with Antagonism and Detachment, which are conceptualized as pathological low variants of Agreeableness and Extraversion, respectively (DeYoung & Krueger, 2018; Gore & Widiger, 2013; Suzuki et al., 2015).

### Method

#### *Participants*

Study 3 includes participants from Samples 1 (ESCS) and 2 (SAPA), described above, and four additional samples, described below. See Table 1 for demographic details.

***Sample 3***. This sample included 259 individuals recruited as part of a longitudinal study on personality, well-being, and personal projects.

***Sample 4***. This sample included 280 participants, who were recruited at a liberal arts college in the Pacific Northwest and completed study measures online.

***Sample 5***. This sample included 323 individuals recruited via a combination of Qualtrics panels and from the campus of the University of Minnesota Twin Cities as part of a study on social cognition, personality, and psychopathology. Participants received an online informed consent document before beginning the study, then completed an online battery of questionnaires and behavioral tasks, including self-report measures and performance tests of social cognition.

***Sample 6.*** This sample included 195 participants, 91 of whom were undergraduate students recruited on the campus of a small liberal arts college in the Pacific Northwest, and the remaining 104 individuals were recruited online using the Qualtrics *Panels* recruitment system.

### *Measures*

Participants in all samples completed items from the Trait Affiliation Scale and BFAS, as well as demographic information. Some participants completed measures of psychopathology (Samples 3 and 5), empathy (Samples 1, 3, and 5), and cognitive ability (Samples 2 and 3). To assess cognitive ability in Sample 3, participants completed a 16-item ICAR measure (Dworak et al., 2021). Participants also completed the Personality Inventory for DSM-5 (PID-5; Krueger et al., 2012) in Sample 3, Computer Adaptive Test of Personality Disorders: Static Form (CAT-PD; Simms et al., 2011) in Sample 5, and Interpersonal Reactivity Index (IRI; Davis, 1980) in Samples 3 and 5. (See our supplemental methods for additional information on the measures.)

### *Statistical Approach*

To assess the internal consistency of the final Trait Affiliation Scale, we computed Alpha and Omega in six samples (McDonald, 1999; Revelle & Condon, 2019). Parallel analyses (Hayton et al., 2004) and Velicer's MAP tests (O'connor, 2000) were also conducted in each sample, to examine the suggested factor structure. We then computed correlations with various

other personality variables and demographic constructs, including the Big Five, pathological personality traits, empathy, intelligence, age, and gender.

## Results and Discussion

Cronbach's Alpha, $\omega$, and $\omega_h$ (using a two-group-factor model), in each sample, are displayed in Table 3 (with descriptive statistics). Across samples, alpha values suggested acceptable internal consistency. Values of $\omega$ suggested adequate unidimensionality of the Trait Affiliation Scale.

MAP tests yielded mixed results, with either one factor or two being suggested as optimal across datasets. The results of parallel analyses and examination of scree plots suggested a similar optimal number of factors, ranging from one to three (Figure S6). Closer examination of factor loadings suggested a first factor in all samples with relatively strong loadings from most items and a second factor that was primarily related to item coding direction, with loadings from negatively keyed items. This is not unusual in the presence of some amount of acquiescence bias and highlights the utility of balanced keying, so that the variance specific to negatively keyed items is canceled out in the total scale score.

Correlations of the Trait Affiliation Scale with other personality variables are displayed in Table 4, organized by sample. The highest correlations were seen for Compassion and Enthusiasm, consistent with theory and scale derivation. Next highest correlations were seen for Extraversion and Agreeableness, with smaller correlations for Assertiveness, Politeness, and other Big Five traits. There were also strong correlations with empathy (positive) and Detachment (negative). Cognitive ability was not related to Affiliation in Sample 3 but was (negatively) in Sample 2. Finally, across samples, we observed associations with gender and age, with women and younger individuals tending to have higher Trait Affiliation.

The pattern of results across a range of samples and measures gives support for reliability and validity of the scale. Affiliation was consistently associated with related measures in the hypothesized directions. Correlations between Affiliation and conceptually unrelated constructs —including other Big Five domains and cognitive ability—were generally low (in absolute value), providing evidence of discriminant validity.

## Study 4: Test-Retest Reliability

Because traits are defined by their relative stability over time (including across situations and development), a trait questionnaire should provide a similar rank-ordering of participants when taken multiple times. Although internal consistency is typically considered a form of reliability, finding one form of reliability does not guarantee a measure will display other forms (Leppink & Perez-Fuster, 2017). In Study 4, we examined test-retest reliability of the Trait Affiliation Scale, in a four-wave dataset.

### Method

#### *Participants, Procedure, and Materials*

This study used participants from Sample 3 (described above). Participants provided data at four time points including 259 individuals at Time 1, 196 at Time 2, 190 at Time 3, and 151 at Time 4. At each of the time points, participants completed items from the Trait Affiliation Scale, as well as a variety of other questionnaires and a personal projects analysis task. Time points were spaced approximately six months apart.

#### *Statistical Approach*

To quantify test-retest reliability, we first computed bivariate Pearson correlations among participants' Trait Affiliation Scale scores across each pair of time points, using pairwise deletion. Because the appropriateness of using Pearson correlations to assess test-retest reliability

has been called into question (Aldridge et al., 2017; Koo & Li, 2016) and to facilitate simultaneous analysis of participants' scores across more than two time points, we also computed the intraclass correlation (ICC) among participants' scores. Specifically, we computed a single-measurement, absolute-agreement, 2-way mixed-effects ICC (Aldridge et al., 2017; Koo & Li, 2016). For the sake of comprehensiveness, we computed and report ICCs using both pairwise and listwise deletion. 95% confidence intervals were computed for the ICCs.

## Results and Discussion

Bivariate correlations of Trait Affiliation Scale scores across different time points are presented in Table S3. All correlations were strong, positive, and statistically significant, ranging from .70 to .84 ($p$'s < .001). When computed using all participants in the dataset ($n$ = 259), the intraclass correlation among Trait Affiliation Scale scores was .76 (95% CI: [.72, .79]). When computed using only participants with data points at all four times ($n$ = 142), the intraclass correlation among Trait Affiliation Scale scores was .77 (95% CI: [.73, .81]).

Using established criteria, bivariate and intraclass correlations suggest acceptable test-retest reliability for the scale (Aldridge et al., 2017; Cicchetti, 1994; Koo & Li, 2016; Matheson, 2019). Given that test-retest reliability is often measured at shorter time intervals than in the current dataset—i.e., days or weeks vs. roughly six-month intervals in the current study (Marx et al., 2003; Park et al., 2018)—and that college students in young adulthood exhibit considerable personality change, our results are promising.

## Study 5: Criterion and Incremental Validity

In addition to providing evidence of validity by examining associations with existing personality questionnaires, another component of scale validation should be to provide evidence of criterion validity. Because personality traits represent stable cognitive, motivational,

emotional, and behavioral patterns, scores on a given questionnaire should be able to predict real-world outcomes relevant to the domain of functioning represented (McAdams & Pals, 2006). Consequently, we examined social interaction, social cognitive ability, and interpersonal outcomes such as social network size or level of social engagement (Dolan & Fullam, 2004; Roberts et al., 2007; Roberts et al., 2008).

Past research supports a positive association between Extraversion and the size of one's social network, operationalized as the number of individuals participants contacted in the last month or by asking participants to list people with whom they are close (Roberts et al., 2008; Selfhout et al., 2010). Some evidence suggests this positive association with Extraversion is specific to an individual's support clique—the number of individuals in one's inner circle of close friends (Roberts et al., 2008). Others have also found positive associations between social network size and Agreeableness (Selfhout et al., 2010).

Though a limited amount of research has examined social network size and social engagement in relation to levels below the Big Five in the personality trait hierarchy, we anticipated that outcomes such as social network size and other measures of social engagement would be related to scores on the Trait Affiliation Scale, given its measurement content, theoretical importance for close relationships, and association with Agreeableness and Extraversion.

Another potential correlate of Trait Affiliation is individual differences in social cognitive abilities such as emotion perception and theory of mind. Performance on tests of social cognition has been linked to individual differences in Agreeableness and its subfactors (Allen et al., 2017; Nettle & Liddle, 2008), and social cognition may be associated with the interstitial trait of Affiliation as well.

In addition to establishing associations of the Trait Affiliation Scale with existing questionnaires and measures of social functioning, it is important to establish relations with moment-to-moment affiliative behavior. As trait levels of a construct can be conceptualized as probability density distributions of states (Fleeson, 2001; Fleeson & Gallagher, 2009), one would expect scores on a valid trait measure to correlate with state measures of the same construct. Thus, we also sought to establish associations between Trait Affiliation and state affiliation, both at rest and after induction of affiliative states.

Emotion induction refers to the use of psychological techniques—such as showing video stimuli—to elicit specific emotional or other affective states (Gross & Levenson, 1995; Philippot, 1993). Though batteries of standardized emotional film clips exist for the induction of states such as amusement, anger, fear, and disgust (e.g., Gross & Levenson, 1995), similar stimuli for other specific emotional states are harder to find. For affiliation, we currently know of a single study establishing a stimulus for the induction of affiliative states, showing that induced increases in participants' warmth and affection were positively associated with scores on the MPQ Social Closeness scale (Morrone-Strupinsky & Depue, 2004). In the current research, we sought to expand this induction paradigm, examining state affiliation across a range of video stimuli, rather than relying on a single film clip.

While examining whether the Trait Affiliation scale could predict scores on outcomes of interest, such as measures of social behavior, social cognitive ability, interpersonal interactions, and affiliative states, we also tested for incrementality validity. To be maximally useful, the scale should predict variance in interpersonal outcomes over and above variance explained by measures of related constructs, most importantly Compassion and Enthusiasm. Thus, in this study, we examined how Trait Affiliation was associated with participants' social goals,

frequency of social events and behaviors, social network size, social cognition, baseline state affiliation, and response to affiliative stimuli, before and after controlling for other relevant variables.

## Method

### *Participants, Procedure, and Materials*

This study included participants from Samples 4 and 5, which were described in Study 3. Participants in Sample 4 completed the Trait Affiliation Scale and BFAS, as well as measures of social goals and behaviors including the Approach and Avoidance Social Goals Scale (Elliot et al., 2006), Daily Events Scale (Gable, 2000), and Social Events Scale (Gable & Impett, 2012). Key variables of interest were (1) approach friendship goals (the mean of 4 items; e.g., "I am trying to deepen my relationships with my friends"), (2) avoidance friendship goals (the mean of 4 items; e.g., "I am trying to stay away from situations that could harm my friendships"), (3) positive social events (the mean of 8 items; e.g., "Spent pleasant or relaxing time with friends/date/family"), (4) negative social events (the mean of 8 items; e.g., "Others acted disinterested in something we said or did"), (5) positive daily event frequency (the mean of 17 items; e.g., "Had other type of pleasant event (not listed above) with friends, family, or date"), and (6) negative daily event frequency (the mean of 19 items; e.g., "Had problems controlling negative feelings"). All items are presented in Table S4.

Participants in Sample 5 completed the Trait Affiliation Scale, BFAS, and a variety of measures assessing interpersonal functioning, including a measure of social network size and tests of social cognitive ability. Sample 5 social outcome measures included the *Lubben Social Network Scale – Revised (LSNS-R;* Lubben, 1988*),* a mentalizing vignettes task (Stiller & Dunbar, 2007), a mental state attribution task using computerized shape animations (Abell et al.,

2000), and the Reading the Mind in the Eyes Task (Baron-Cohen et al., 2001). See the supplement for a detailed explanation of these measures.

Participants in Sample 6 completed the Trait Affiliation Scale, BFAS, and measures of state affiliation and positive emotions before and after an affiliative emotion induction paradigm. State affiliation was calculated as the average on endorsements for the adjective-pair items "Warm and Affectionate," "Compassionate and Kind," and items asking participants to rate their current desire to "spend time with loved ones" and "connect with others." A positive emotion control variable was calculated as the average of adjective-pair items "Energetic and Happy" and "Calm and at Ease." Items used a seven-point scale. The state affiliation items were inspired by research from Morrone-Strupinsky and Depue (2004) and our own previous work on affiliation, compassion, and enthusiasm. The positive emotion control variables adapted adjectives from the PANAS-X (Watson & Clark, 1999), which uses single-adjective items; these included two adjectives from the joviality scale (i.e., "energetic" and "happy") and two from the serenity scale ("calm" and "at ease"). Participants completed items once at the beginning of the study and again after each of three film stimuli. Stimuli were chosen to elicit affiliation, focusing on markers like physical touch, initiation of new relationships, parent-child relationships, and verbal indicators of love/friendship. Each participant was shown a random sample of three videos, including segments from *Juno, Forrest Gump, Blue Jay, Love Actually, The Spectacular Now,* a 2012 Olympics commercial, and an Extra Gum commercial (citations in supplement). Total post-video state affiliation was computed as the average of 12 items (four completed after each of three videos), with post-video positive emotion computed as the average of 6 items (two completed after each of three videos).

***Statistical Approach***

First, Pearson correlations were computed to test for associations of Trait Affiliation with variables of interest. Finally, we computed a series of multiple regression models to test whether Trait Affiliation was still associated with interpersonal outcome variables 1) after controlling for variance in Compassion and Enthusiasm, 2) after controlling for the aforementioned variables as well as age and gender, and 3) after controlling for the aforementioned variables as well as Politeness and Assertiveness. Models were computed for six variables related to social goals and behaviors in Sample 4, for a single social network scale variable in Sample 5, and for pre- and post- state affiliation in Sample 6. Additional models in Sample 6 were computed that predicted post-video state affiliation controlling for pre-video state affiliation and for post-video levels of general positive emotionality. Repeated-measures analysis of variance models were also computed in Sample 6 to examine effectiveness of the emotion-induction manipulation and interactions of the manipulation with Trait Affiliation. Finally, we computed models using a latent social cognition variable for Sample 5. Accuracy scores from the three social cognition tasks were used as indicators of a single latent variable, predicted by 1) Affiliation controlling for variance in Compassion and Enthusiasm, 2) Affiliation controlling for these variables as well as age and gender, and 3) Affiliation controlling for these variables as well as Politeness and Assertiveness. Performance on a memory condition of the vignette task was included as an additional predictor, to control for non-social abilities. Maximum likelihood estimation was used, and common fit indices were computed. The Latent Variable Analysis (LAVAAN) package for R was used for estimating our latent variable models (Rosseel, 2012).

## Results and Discussion

Associations of Trait Affiliation with social outcomes are presented in Table 5. Trait Affiliation was positively associated with frequency of approach friendship goals, avoidance

friendship goals, positive social events, and general positive events, whether or not we controlled for other relevant variables. Trait Affiliation was not associated with frequency of negative events (general or social), at either the zero-order or partial level. Trait Affiliation was also positively associated with scores on the Social Network Scale, whether or not we controlled for other relevant variables. Finally, Trait Affiliation was associated with latent social cognitive ability, whether or not we controlled for other relevant variables. Our latent variable model testing the bivariate association with Affiliation showed marginal fit (RMSEA = .125, SRMR = .038, TLI = .881), whereas models showed acceptable fit across the other specifications (RMSEA's: .052–.082, SRMR's: .022–.029, TLI's: .950–.964; Hu & Bentler, 1999).

Across the affiliative video clips, there was a significant increase in state affiliation ($t_{(193)}$ = 3.1, $p$ = .002, $d$ = 0.45) from pre- to post- video questions. There were also significant Time (pre vs. post)-by-Trait-Affiliation interaction effects on state affiliation ($F_{(1, 191)}$ = 4.9, $p$ = .027, *partial* $\eta^2$ = .03). Trait Affiliation was associated with pre-video state affiliation and with post-video state affiliation (with or without controlling pre-video values and/or general positive emotionality); associations held when controlling for relevant BFAS aspects, age, and gender.

## General Discussion

Across multiple samples, we have shown that the Trait Affiliation Scale is reliable and valid and predicts social variables incrementally beyond variance explained by Enthusiasm and Compassion. The scale fits well within the broader factor space and nomological network of current trait systems while offering unique measurement capabilities and incremental validity. The replication of results across multiple samples suggests findings are likely robust. This project replicates previous research integrating the Big Five and IPC factor spaces (DeYoung et al., 2013) and introduces a new Trait Affiliation Scale.

**Synthesizing Findings with Previous Frameworks**

First, results using the initial item pool for the Trait Affiliation Scale replicated previous findings integrating measures of the Big Five, IPC, and Affiliation into a single factor space. Specifically, Trait Affiliation fell between the Big Five aspects of Enthusiasm and Compassion, which in turn corresponded to markers of the IPC's Love axis and the Gregarious-Extraverted octants. In past work, measures related to Trait Affiliation—Warmth facets from the NEO PI-R and AB5C-IPIP, the MPQ social closeness scale, and a single item measure of how affectionate participants were—also fell near the hypothesized 22.5° angle, with some of these measures falling slightly nearer to 0º (e.g., AB5C-IPIP Warmth, which is a facet of Agreeableness), some nearer 45º (e.g., MPQ Social Closeness and NEO PI-R Warmth, which is a facet of Extraversion), and the single-item "affectionate" variable near 22.5º but closer to the origin, presumably due to comparatively lower reliability versus our current scale (DeYoung et al., 2013). We have now more precisely captured the 22.5° position of Trait Affiliation using a longer, more reliable measure, as well as provided evidence of construct validity for the scale in multiple samples.

Trait Affiliation is interstitial because it falls exactly halfway between Extraversion and Agreeableness, and this is of both theoretical and methodological consequence. In relation to theory, the fact that Trait Affiliation is not identical to markers of the IPC love axis at 0° (which is sometimes labeled as "affiliation" by IPC researchers), but is instead shifted somewhat toward Extraversion, supports the importance of reward processes, in Affiliation, as sensitivity to reward is associated primarily with Extraversion (Blain et al., 2021; DeYoung, 2015; Smillie et al., 2012; 2019). Individual differences in Affiliation are likely related to underlying mechanisms beyond those of Agreeableness or Compassion alone (Depue & Morrone- Strupinsky, 2005).

According to CB5T, traits reflect variation in the mechanisms that allow people to pursue their goals effectively and shape which goals are pursued (DeYoung, 2015). Individuals higher in Affiliation tend to pursue goals through social interaction and building closeness with others; they find these pursuits rewarding and are good at connecting with others.

Measuring this interstitial trait directly may be an important methodological advance. Scores on the new Trait Affiliation Scale not only predicted metrics such as social goals and behaviors, social network size, and social cognitive ability, they also had incremental validity over variance explained by both Compassion and Enthusiasm; further, incremental validity also remained when additionally controlling for Politeness and Assertiveness, the other aspects of Agreeableness and Extraversion.

The evidence for incremental validity over Compassion and Enthusiasm might lead readers to wonder what additional variance the scale is capturing, given that Trait Affiliation falls at the intersection of Compassion and Enthusiasm rather than being fully distinct from either aspect. Though one could speculate about underlying psychological or neurobiological mechanisms that are more specifically related to Affiliation and associated real-world behaviors (vs. Compassion or Enthusiasm), an equally likely possibility is that the new scale simply has greater measurement precision and ability to capture variance specific to this vector in personality space, relative to merely aggregating scores on Compassion and Enthusiasm. By using ten items that specifically target this vector, we were able to pinpoint variance particularly relevant to interpersonal outcomes such as social network size or quantity of social goals and behaviors.

As a field, personality psychology has begun to move from a focus on descriptive models to explanatory theories. With this shift, it has become increasingly important to be able to

reconcile and integrate various theoretical frameworks, which can sometimes appear to conflict with one another. To fully understand and explain complex traits, their interrelations, and mechanisms, relying exclusively on hierarchical models that depict simple structure (e.g., the Big Five) is sometimes inadequate. In the case of interpersonal traits, the circumplex nature of Extraversion, Agreeableness, their aspects, and their intersection (i.e., Trait Affiliation) must be considered. Creating a unified structural model of the IPC axes and octants, Extraversion, Agreeableness, and Trait Affiliation—a model developed in previous research and forwarded in the present work—allows us to integrate the most broadly used personality trait taxonomy with the most broadly used model for understanding individual differences in social behavior. We believe this integration, and in particular the development of our new Trait Affiliation Scale, can facilitate future development of integrative frameworks and theories to explain the functions and mechanisms of—as well as individual differences in—social behavior.

**Facilitating Future Affiliation Research**

Our work opens possibilities for future research. For instance, the Trait Affiliation Scale could be incorporated into studies on psychopathology. Because social dysfunction is seen across an array of mental disorders and symptom dimensions, incorporating the scale into work on personality disorders, depression, autism, and psychosis could help researchers better understand how problems with affiliation relate to traits such as Antagonism and Detachment, while also potentially facilitating the development of screening and intervention programs to target maladaptive low affiliation (DeYoung & Krueger, 2018; DeYoung & Weisberg, 2018). This approach would be in line with initiatives such as the National Institute of Mental Health's Research Domain Criteria and the Hierarchical Taxonomy of Psychopathology (Insel et al., 2010; Kotov et al., 2017). Future studies could also administer the scale along with existing

measures of social anhedonia or interpersonal pleasure to better clarify relations among—and distinct components of—these constructs (Gooding & Pflum, 2013). In both clinical and general population samples, the scale could also be usefully incorporated into studies using methods already prominent among interpersonal researchers, including experience sampling and dyadic designs (Edershile & Wright, 2020; Human et al., 2020; Ringwald & Wright, 2021; Vize et al., 2021).

The scale could also prove useful for neurobiological research. Theory and research suggest Agreeableness and Extraversion are related to distinct brain systems. For instance, Agreeableness has been linked to the default network (Allen et al., 2017; Udochi et al., 2021), whereas Extraversion has been linked to the valuation network and dopaminergic activity (Civai et al., 2016; Depue & Fu, 2013; Smillie et al., 2011). Promising candidates for substrates more specific to affiliation include oxytocin and mu opioids (Depue & Morrone-Strupinsky, 2005). Differentiating the roles of dopamine versus opioids may be particularly fruitful. Whereas dopamine produces desire to pursue rewards, the pleasure one experiences from receiving rewards—including social rewards—involves endogenous opioids (Depue & Morrone-Strupinsky, 2005). On this basis, affiliation has been hypothesized to reflect sensitivity to hedonic reward, associated with opioidergic functioning (Depue & Collins, 1999; Depue & Morrone-Strupinsky, 2005; DeYoung, 2013; DeYoung & Weisberg, 2018). Specific (albeit tentative) evidence for the role of opioids in affiliation is beginning to emerge: certain types of tactile stimulation and social touch lead to increased opioid activity, sensitivity to psychopharmacological or tactile manipulation of opioid activity appears to be moderated by trait social closeness, and opioid receptor availability is associated with scores on Affiliation-related measures (Depue & Morrone-Strupinsky, 2005; Karjalainen et al., 2016; Nummenmaa et

al., 2015; 2016). Future work should further investigate neural substrates of affiliation—including both systems shared with and unique from—other related traits.

## Conclusion

Trait Affiliation is a consequential, interstitial trait representing individual differences in the desire to form and maintain relationships, which falls at the intersection of the Compassion aspect of Agreeableness and the Enthusiasm aspect of Extraversion. The current work introduces a Trait Affiliation Scale that shows high reliability, construct validity, and incremental validity in predicting relevant outcome variables. The scale shows promise for future applications in interpersonal research and may prove particularly useful in research on the neurobiology of affiliation and on patterns of social dysfunction seen across a variety of mental disorders.

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**Table 1.** Summary of samples and demographic characteristics

| | Samples | | | | | |
|---|---|---|---|---|---|---|
| | Sample 1. ESCS (n = 409) | Sample 2. SAPA (n = 25732) | Sample 3. PPA (n = 259) | Sample 4. SGB (n = 280) | Sample 5. SC (n = 323) | Sample 6. AV (n = 195) |
| | | | | | | |
| **Studies** | 1, 3 | 2, 3 | 3, 4 | 3, 5 | 3, 5 | 3, 5 |
| | | | | | | |
| **Purpose** | Item selection, content validity | Scale refinement, content validity | Content validity, test-retest reliability | Content and criterion validity | Content and criterion validity | Content and criterion validity |
| | | | | | | |
| **Demographics** | | | | | | |
| | | | | | | |
| Mean Age (SD) | 52.8 (12.5) | 26.0 (10.4) | 18.8 (0.8) | 20.5 (4.6) | 26.8 (14.0) | 22.5 (4.0) |
| | | | | | | |
| Gender/Sex | | | | | | |
| Female (%) | 243 (59.4) | 15808 (61.4) | 185 (71.4) | 203 (72.5) | 258 (70.9) | 121 (62.1) |
| Male (%) | 166 (40.6) | 9924 (38.6) | 74 (28.6) | 71 (25.4) | 64 (19.8) | 74 (37.9) |
| Intersex/ non-binary (%) | | | | 6 (2.1) | 1 (0.3) | |
| | | | | | | |
| Race/Ethnicity | | | | | | *Not reported* |
| White (%) | 400 (97.8) | 11984 (67.6) | 159 (75.7) | 204 (72.9) | 231 (71.5) | |
| Black (%) | < 1% | 1691 (9.5) | 4 (1.5) | 4 (1.4) | 4 (1.2) | |
| Asian (%) | < 1% | 1685 (9.5) | 34 (13.1) | 24 (8.6) | 56 (17.3) | |
| Latino (%) | < 1% | 894 (5.0) | 5 (1.9) | 24 (8.6) | 4 (1.2) | |
| Indigenous (%) | < 1% | 139 (0.8) | | 3 (1.1) | 0 (0) | |
| Multiracial or other (%) | < 1% | 1344 (7.6) | 18 (6.9) | 21 (7.5) | 28 (8.7) | |
| Did not respond (%) | 3 (+0.7) | 7995 (+31.1) | 39 (+15.1) | | | |

**Table 2.** *Trait Affiliation Scale candidate items with IPIP/SAPA codes and relevant statistics*

| IPIP Code | SAPA Code | Item Text | *r Ac-Ee* *ESCS* | *r Ee* *ESCS* | *r Ac* *ESCS* | $a_i$ SAPA | AUC SAPA | Final Scale? |
|---|---|---|---|---|---|---|---|---|
| H1151 | q_505 | Cheer people up. | .62 | .52 | .47 | 1.28 | .76 | Y |
| X161 | q_748 | Enjoy bringing people together. | .45 | .37 | .37 | 0.98 | .64 | Y |
| A4 | q_899 | Find it difficult showing people that I care about them. (R) | -.47 | -.41 | -.40 | -0.85 | .57 | Y |
| H100 | q_1000 | Give compliments. | .48 | .37 | .43 | 0.93 | .57 | Y |
| H26 | q_1418 | Make others feel good. | .60 | .41 | .42 | 1.24 | .69 | Y |
| V181 | q_2881 | Don't feel the need to be close to others. (R) | -.47 | -.42 | -.42 | -0.89 | .58 | Y |
| V230 | q_2970 | Have no need for close friendships. (R) | -.48 | -.41 | -.36 | -0.76 | .46 | Y |
| V129 | q_3030 | Love to make other people happy. | .52 | .39 | .45 | 1.15 | .66 | Y |
| (NA) | q_3893 | Feel affectionate towards people. | — | — | — | 1.16 | .74 | Y |
| V299 | q_2900 | Don't think it's important to socialize with others. (R) | -.46 | -.39 | -.30 | -1.04 | .70 | Y |
| D42 | q_854 | Feel that having close friends is not especially important to me. (R) | -.40 | -.34 | -.34 | -0.73 | .44 | N |
| A132 | q_1086 | Have difficulty showing affection. (R) | -.55 | -.50 | -.49 | -0.72 | .45 | N |
| A79 | q_1154 | Hug my close friends. | .49 | .37 | .43 | 0.77 | .50 | N |
| A84 | q_1189 | Keep my happy feelings to myself. (R) | -.47 | -.47 | -.45 | -0.58 | .32 | N |
| D6 | q_1471 | Often do nice things for people. | .44 | .30 | .35 | 0.86 | .50 | N |
| H682 | q_1535 | Prefer to do things by myself. (R) | -.31 | -.29 | -.28 | -0.32 | .12 | N |
| H660 | q_1923 | Want to be left alone. (R) | -.42 | -.46 | -.37 | -0.66 | .39 | N |
| V218 | q_2764 | Am good at understanding others' feelings. | .49 | .41 | .42 | 0.85 | .51 | N |
| V285 | q_2869 | Do not go out of my way to make others smile or laugh. (R) | -.34 | -.30 | -.29 | -0.81 | .50 | N |
| V295 | q_3006 | Know what to say to make people feel good. | .47 | .35 | .33 | 0.70 | .41 | N |
| M44 | q_3697 | Help my friends. | .41 | .33 | .38 | 0.83 | .45 | N |
| H21 | q_150 | Am interested in people. | .59 | .45 | .45 | 0.85 | .52 | N |
| H107 | q_1419 | Make people feel at ease. | .66 | .46 | .47 | 0.83 | .50 | N |
| D82 | q_1575 | Rarely enjoy being with people. (R) | -.43 | -.40 | -.34 | -0.65 | .38 | N |

**Table 3.** *Descriptive statistics and internal consistency for the Trait Affiliation Scale*

| Sample | Mean (SD) | Skew | [Min, Max] | α | ω | $\omega_h$ | $MAP_1$ | $MAP_2$ | $MAP_3$ |
|---|---|---|---|---|---|---|---|---|---|
| 1. ESCS (*n* = 409) | 4.0 (0.6) | -0.6 | [2.2, 5.0] | .80 | .83 | .58 | .032 | .044 | .069 |
| 2. SAPA (*n* = 25732) | — | — | — | .88 | .92 | .59 | .044 | .043 | .064 |
| 3. PPA Wave 1 (*n* = 259) | 3.9 (0.5) | -0.4 | [2.5, 4.9] | .82 | .84 | .42 | .026 | .060 | .097 |
| PPA Wave 2 (*n* = 196) | 3.9 (0.4) | -0.2 | [2.6, 4.9] | .81 | .85 | .65 | .040 | .055 | .071 |
| PPA Wave 3 (*n* = 190) | 3.9 (0.4) | -0.2 | [2.8, 5.0] | .80 | .85 | .49 | .040 | .044 | .071 |
| PPA Wave 4 (*n* = 151) | 4.0 (0.5) | -0.5 | [1.9, 5.0] | .87 | .90 | .69 | .029 | .038 | .057 |
| 4. SGB (*n* = 280) | 4.0 (0.5) | -1.0 | [1.2, 5.0] | .85 | .88 | .57 | .037 | .037 | .055 |
| 5. SC (*n* = 335) | 4.0 (0.6) | -0.5 | [1.7, 5.0] | .86 | .90 | .53 | .059 | .036 | .057 |
| 6. AV (*n* = 195) | 3.9 (0.6) | -0.6 | [1.6, 5.0] | .84 | .88 | .53 | .045 | .037 | .060 |

*Note.* ESCS = Eugene Springfield Community Sample, SAPA = Synthetic Aperture Personality Assessment, PPA = Personality Projects Analysis Dataset, SGB = Social Goals and Behaviors Dataset, SC = Social Cognition Dataset, AV = Affiliative Videos Dataset, MAP-1, 2, 3 = Velicer's Minimum Average Partial for 1, 2, and 3 factors.

**Table 4.** Construct validity for the Trait Affiliation Scale across multiple samples (Pearson Correlations)

| Sample | A | E | Comp. | Enth. | Polite. | Assert. | Empath. | Antag. | Detach. | IQ | Sex/Gender | Age | C | N | O/I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. ESCS (*n* = 409) | .56 | .59 | .64 | .66 | .30 | .32 | .52 | — | — | — | -.34 | .01 | .19 | -.12 | .24 |
| 2. SAPA (*n* = 25732) | .67 | .70 | .76 | .71 | .27 | .40 | — | — | — | -.16 | -.29 | -.03 | .16 | -.14 | .16 |
| 3. PPA Wave 1 (*n* = 259) | .38 | .63 | .70 | .69 | .25 | .36 | — | -.08 | -.63 | .04 | -.03 | -.11 | .03 | -.19 | .23 |
| PPA Wave 2 (*n* = 196) | .57 | .62 | .74 | .72 | .21 | .32 | — | -.07 | .61 | — | — | — | .13 | -.13 | .24 |
| PPA Wave 3 (*n* = 190) | .59 | .61 | .77 | .73 | .29 | .30 | — | -.16 | -.58 | — | — | — | .12 | -.22 | .27 |
| PPA Wave 4 (*n* = 151) | .60 | .63 | .76 | .78 | .31 | .27 | .60 | -.11 | .66 | — | — | — | .06 | -.29 | -.30 |
| 4. SGB (*n* = 280) | .67 | .56 | .74 | .66 | .42 | .31 | — | — | — | — | -.20 | -.14 | .11 | .04 | .17 |
| 5. SC (*n* = 323) | .67 | .66 | .76 | .72 | .42 | .43 | .50 | -.47 | -.70 | — | -.20 | -.16 | .28 | -.30 | .34 |
| 6. AV (*n* = 195) | .49 | .51 | .65 | .64 | .04 | .24 | — | — | — | — | -.09 | -.26 | .15 | -.24 | .34 |

*Note.* ESCS = Eugene Springfield Community Sample, SAPA = Synthetic Aperture Personality Assessment, PPA = Personality Projects Analysis Dataset, SGB = Social Goals and Behaviors Dataset, SC = Social Cognition Dataset, AV = Affiliative Videos Dataset, A = Agreeableness, E = Extraversion, Comp. = Compassion, Enth. = Enthusiasm, Polite. = Politeness, Assert. = Assertiveness, Empath. = Empathy, Antag. = Antagonism, Detach. = Detachment, C = Conscientiousness, N = Neuroticism, O/I = Openness/Intellect.

**Table 5.** *Associations of Trait Affiliation and Study 5 interpersonal variables*

| Criterion Variable | $r_{aff}$ | *p* | $\beta_{aff\text{-}1}$ | *p* | $\beta_{aff\text{-}2}$ | *p* | $\beta_{aff\text{-}3}$ | *p* |
|---|---|---|---|---|---|---|---|---|
| **Sample 4** | | | | | | | | |
| Approach Friendship Goals | .55 | < .001 | .35 | .001 | .34 | .004 | .32 | .005 |
| Avoidance Friendship Goals | .35 | < .001 | .38 | .001 | .35 | .002 | .42 | .001 |
| Positive Social Events | .47 | < .001 | .34 | .001 | .29 | .009 | .24 | .023 |
| Negative Social Events | .07 | .302 | .16 | .161 | .14 | .247 | .21 | .086 |
| Positive Event Frequency | .45 | < .001 | .42 | < .001 | .36 | .001 | .28 | .009 |
| Negative Event Frequency | .12 | .057 | .17 | .153 | .14 | .258 | .23 | .059 |
| **Sample 5** | | | | | | | | |
| Social Network Scale | .44 | < .001 | .33 | .001 | .24 | .008 | .24 | .009 |
| Latent Social Cognition | .20 | < .001 | .25 | .003 | .19 | .030 | .20 | .019 |
| **Sample 6** | | | | | | | | |
| Pre-video State Affiliation | .56 | < .001 | .23 | .011 | .26 | .005 | .29 | .002 |
| Post-video State Affiliation | .63 | < .001 | .48 | < .001 | .48 | < .001 | .51 | < .001 |
| Post-video State Affiliation (Controlling Pre) | .42 | < .001 | .38 | < .001 | .35 | < .001 | .37 | < .001 |
| Post-video State Affiliation (Controlling Pre Affiliation and Post Pos Emo) | .42 | < .001 | .32 | < .001 | .28 | < .001 | .28 | < .001 |

*Note.* $r_{aff}$ = Pearson correlation between Trait Affiliation and given criterion variable, $\beta_{aff\text{-}1}$ = Standardized regression coefficient of Trait Affiliation predicting criterion variable controlling for Compassion and Enthusiasm, $\beta_{aff\text{-}2}$ = Standardized regression coefficient of Trait Affiliation predicting criterion variable controlling for Compassion, Enthusiasm, age, and gender, $\beta_{aff\text{-}3}$ = Standardized regression coefficient of Trait Affiliation predicting criterion variable controlling for Compassion, Enthusiasm, age, gender, Politeness, and Assertiveness.

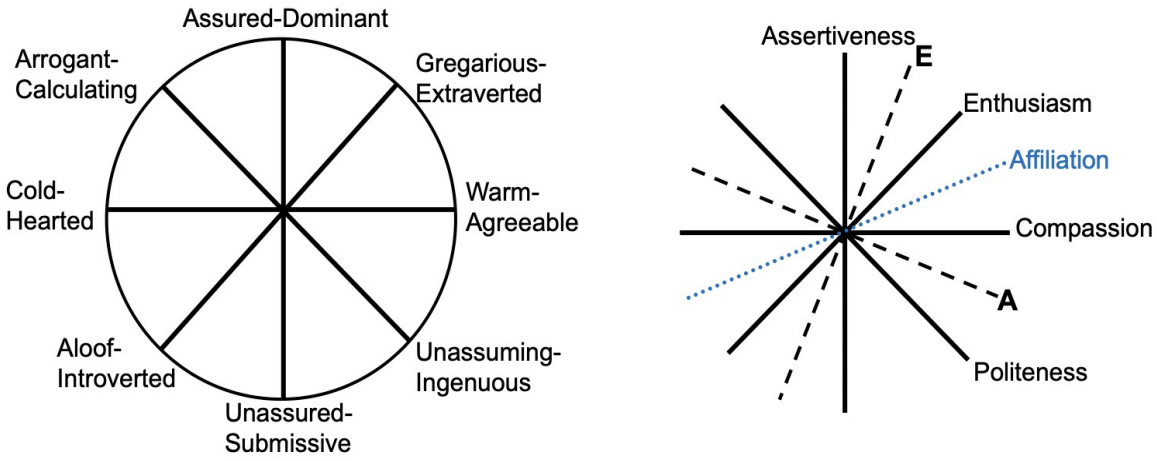


**Figure 1.** ***Integration of the Big Five, Interpersonal Circumplex, and Trait Affiliation.***

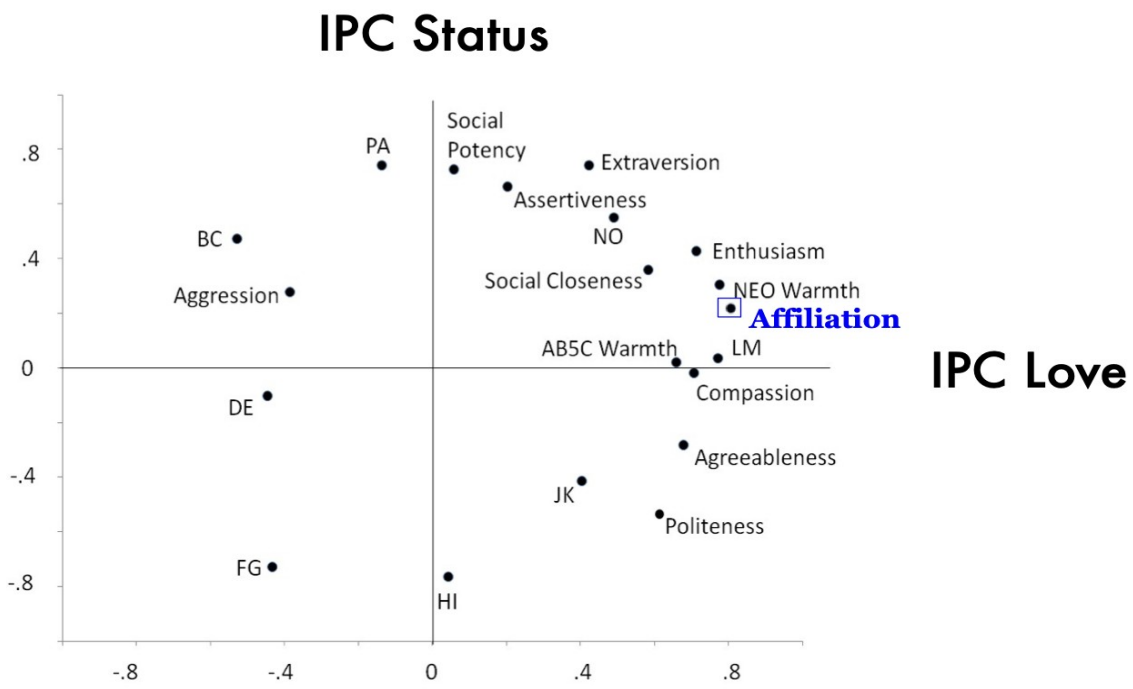


**Figure 2.** ***Trait Affiliation empirically mapped onto the circumplex model with other interpersonal variables.*** PA = Assured-Dominant, NO = Gregarious-Extraverted, LM = Warm-Agreeable, JK = Unassuming-Ingenuous, HI = Unassured-Submissive, FG = Aloof-Introverted, DE = Cold-Hearted, BC = Arrogant-Calculating.

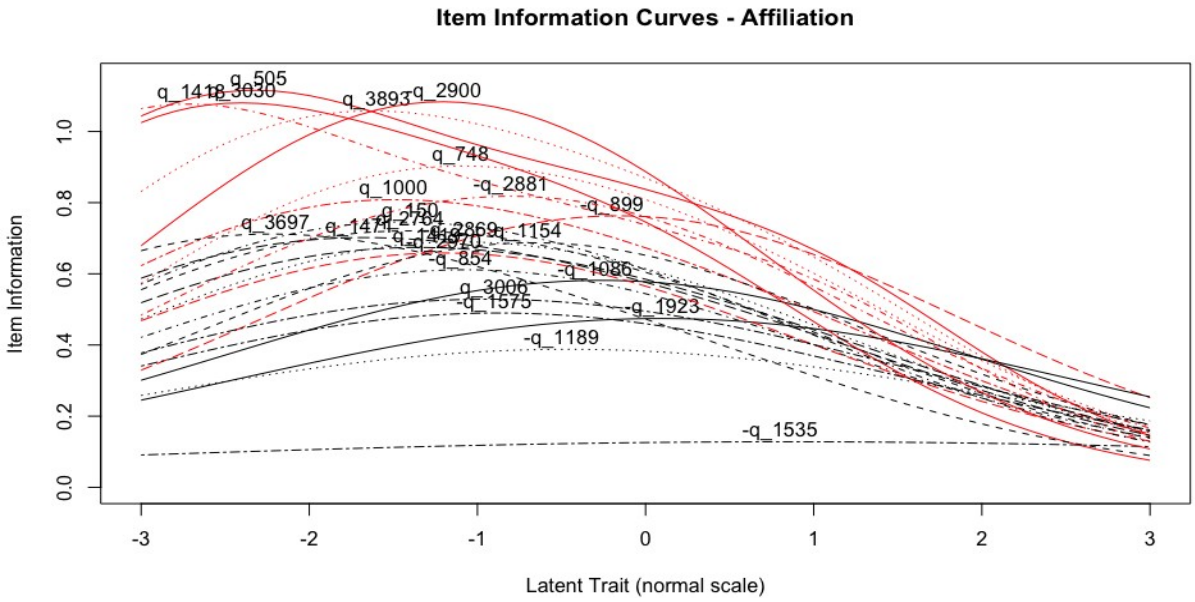


**Figure 3.** ***Information curves for Trait Affiliation Scale candidate items.*** Items included in the final scale are highlighted in red.