

Gender and Extroversion as Moderators of the Association Between Alcoholics Anonymous and Sobriety

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ABSTRACT. Objective: Although women make up one third of Alcoholics Anonymous (AA) membership, research on gender and AA has been limited. Findings in the literature are mixed, with few empirical investigations of factors that may moderate any gender differences found. AA is highly interpersonal, and research has found that women are more extroverted than men. The current study explores the impact of AA on sobriety, gender differences in the relationship between AA and sobriety, and whether extroversion can inform our understanding of gender differences. **Method:** A sample of 276 alcohol-dependent adults (180 men, 96 women) was recruited from four sites and followed prospectively for 2.5–3 years. Participants completed the Timeline Followback interview. AA membership was assessed by an item from the Alcoholics Anonymous Involvement scale. Multiple logistic regression analyses were

conducted to determine whether gender, extroversion, AA membership, and their interaction would predict sobriety status at follow-up. **Results:** AA membership significantly increased the odds of achieving a year of sobriety, and this relationship was stronger for women than men (odds ratio [OR] = 4.42, 95% CI [1.14, 17.18]). There were no main or interactive effects of extroversion on sobriety. **Conclusions:** AA was founded by men, and early in its history it was exclusively attended by men. Some have criticized AA for women because of its emphasis on “powerlessness.” Despite its historical beginnings and such debate, this study joins others in finding evidence that women fare better in AA than do men. In this sample, extroversion did not moderate the association between gender and sobriety. Further research is needed on gender differences in AA and its explanatory factors. (*J. Stud. Alcohol Drugs*, 73, 44–52, 2012)

ALCOHOLICS ANONYMOUS (AA) WAS FOUNDED by men, and early in its history it was exclusively attended by men; in fact, women were pointedly excluded from participation (White, 1998). From a feminist perspective, which advocates that women in general should be increasingly empowered in society, AA has been criticized because of its emphasis on “powerlessness” and “surrender” (Berenson, 1991). Despite its historical beginnings and the debate among scholars, women currently comprise one third of the AA membership (Alcoholics Anonymous, 2008). However, research on differences between women and men in AA has been scant (Kelly and Moos, 2003; Timko, 2008).

Gender differences in the association between Alcoholics Anonymous and drinking outcomes

Studies have found that women are more likely to attend meetings (Timko et al., 2005; Weisner et al., 1995), attend them more frequently (Del Boca and Mattson, 2001; Weisner et al., 2003) and for longer durations (Timko et al., 2005), and have greater involvement in 12-step groups (Bodin, 2006; Del Boca and Mattson, 2001) than men. One study found that the association between AA attendance and favorable drinking outcomes was stronger for women than men

(Timko et al., 2002). However, a number of studies found no difference between men’s and women’s meeting attendance (Bodin, 2006; Del Boca and Mattson, 2001; Kelly et al., 2006). Further, one study found men to have higher 12-step affiliation than women, with men more likely to have a sponsor and to feel more comfortable sharing in meetings than women (Kingree, 1997).

Extroversion, drinking outcomes, and AA

If there are differences in the AA experience between men and women, what role does personality play? Feingold’s (1994) meta-analysis found that women have higher levels of extroversion, anxiety, trust, and nurturance than men. The ethos of AA as a fellowship is one of connection to other recovering alcoholics. This experience involves a considerable degree of interpersonal social exchanges, including meeting attendance, speaking in groups, greeting newcomers, mixing before and after meetings, going out for coffee, calling other members for help and support, and sponsorship. Even AA activities that are individual and reflective in nature, such as studying the organization’s central texts and taking a personal inventory, can have interpersonal counterparts because the texts are often studied in group meetings, and the personal inventory, after it is written, is suggested to be shared with another person.

Given the highly social nature of AA, one can logically hypothesize that individuals who are extroverted, outgoing, or people-oriented might be more comfortable, and thus more successful, in AA than those who are not. Individuals

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who are introverted, shy, or less at ease in highly interpersonal settings may be less likely to affiliate with AA than others who are more naturally at ease in groups.

The question of being outgoing or shy can be explored via two conceptual perspectives: the personality dimension of extroversion/introversion and the psychiatric diagnosis of social phobia (social anxiety disorder). The research literature has explored the question of AA affiliation and good drinking outcomes through both of these conceptual lenses.

In studies of personality dimensions that may predict the drinking outcomes of alcoholics, extroversion has not emerged as a relevant factor. However, some studies of personality predictors of AA affiliation suggest that being outgoing is associated with trying AA or staying in AA. Kelly and Moos (2003), for example, found that individuals with greater social involvement were less likely to drop out of AA 1 year later. Similarly, Janowsky and colleagues (1999) found that those who had attended at least one AA meeting in the month after discharge from detoxification had higher levels of extroversion and lower levels of shyness with strangers.

Researchers have also hypothesized that individuals with social phobia would experience more difficulty affiliating with AA than others. Terra et al. (2006) studied a sample of alcohol-dependent patients with and without social phobia who had received inpatient detoxification treatment. They found no differences between patients with and without social phobia in relapse rates or rates of AA attendance in 3- and 6-month follow-ups. However, patients with social phobia were more likely to feel disconnected from the group and more ashamed to attend AA, although these differences were based on very small subsample sizes. In addition, there were stark differences in the proportions of individuals with and without social phobia who chaired an AA meeting at both follow-ups. These findings suggest that although individuals with and without social phobia may have equal rates of AA adherence, those with social phobia do so at greater emotional cost and are less likely to become involved in certain AA practices.

Book et al. (2009) surveyed 103 individuals attending intensive outpatient treatment for substance use disorders. A substantial percentage (37%) reported clinically significant levels of social anxiety. These individuals were four to five times more likely than those with lower social anxiety to acknowledge that shyness interfered with their ability to talk to a therapist and to attend AA or Narcotics Anonymous (NA) and eight times more likely to acknowledge that shyness interfered with their ability to share in group therapy and ask for an AA/NA sponsor.

Social phobia and the gender-specific association between AA and drinking outcomes

Some studies have shown gender-specific effects of social phobia on the association between AA and drinking

outcomes. Thevos et al. (2000) tested the hypothesis that socially phobic alcoholics treated with cognitive behavioral therapy would have better drinking outcomes than those treated with 12-step facilitation therapy because 12-step facilitation therapy would involve the social experience of attending AA meetings. Consistent with this hypothesis, socially phobic female alcoholics treated with cognitive behavioral therapy had longer times to first drink and first heavy drinking day than socially phobic women treated with 12-step facilitation therapy, but the same was not true for men.

Using the same data but looking exclusively at those who received 12-step facilitation therapy, Tonigan et al. (2010) found that women with social phobia were significantly more vulnerable to relapse compared with women without social phobia and men with or without social phobia. Social phobia was not related to the frequency of AA attendance, engagement in AA, or completing Step 5 (admitting wrongs). However, women with social phobia were significantly less likely to have a sponsor at the 3-month follow-up (but not at the 9- and 12-month follow-up assessments).

In summary, there is some evidence that AA involvement may be a stronger predictor of drinking outcomes for women than for men. The personality dimension of extroversion has been linked to aspects of AA involvement, and women are, on average, more extroverted than men. The literature suggests that extroversion may increase the likelihood of engaging in AA activities such as attending meetings, chairing meetings, and, for women, getting a sponsor, all of which could result in better drinking outcomes. Finally, previous research points to the possibility that women high in extroversion, but not men, may have better AA-related odds of achieving a year of sobriety. This assertion is based on the findings of Thevos et al. (2000), who found a three-way interaction between gender, social phobia, and 12-step facilitation treatment in predicting time to relapse. Extrapolating from this finding, women high in extroversion may have better AA-related outcomes than men. However, to our knowledge, no studies have yet tested the hypothesis that extroversion might enhance the effects of AA involvement on drinking outcomes for women compared with men, that is, whether the moderating effect of gender observed in previous research would increase in magnitude as a function of extroversion. Accordingly, in the current study we sought to address three questions: (a) Is membership in AA predictive of subsequent drinking outcomes? (b) If so, is this association different for women and men? (c) If so, does the moderating effect of gender vary as a function of extroversion? Therefore, we hypothesized the following: (a) AA membership would be associated with better drinking outcomes, (b) this association would be stronger for women than men (as reflected in a statistically significant two-way interaction between gender and AA membership), and (c) the moderating

effect of gender would increase in magnitude as a function of extroversion (as reflected in a statistically significant three-way interaction between extroversion, gender, and AA membership). Addressing these hypotheses can potentially inform clinical interventions with both extroverted and introverted individuals.

Method

The current study is a secondary post hoc analysis. Data for the current study were derived from a longitudinal survey of 364 alcoholics recruited from a university outpatient treatment program ($n = 157$), a Veterans Affairs outpatient treatment program ($n = 80$), a moderation-based program ($n = 34$), and individuals from the local community not in treatment at baseline ($n = 93$). The parent study investigated the impact of religious and spiritual change on drinking outcomes. As part of the original study (Robinson et al., 2011), extensive data on covariates of drinking outcomes were collected, including AA membership, drinking outcomes, and personality, as well as diverse baseline demographic and clinical factors. All participants met criteria for alcohol dependence based on the Structured Clinical Interview for DSM-IV (SCID) Axis I Disorders (First et al., 1997). Research assistants were trained to conduct the interview using the SCID training videos and supervision by one of the authors (E.A.R.R.). Respondents were interviewed every 3 months for 2.5–3 years, including every 6 months in person for full assessments and midway during

each 6-month period by telephone to collect drinking data only. In-person assessments took place at a location of the respondent's choice. The same interviewers carried out interviews at all sites.

The current study focused on 276 (75.8%) of the 364 original respondents who completed the final interview after 2.5–3 years of follow-up (hereafter, Time 3 [T3]). An attrition analysis compared study dropouts with those who completed the final interview on the baseline variables presented in Table 1. Those who were retained in the study were not statistically different on clinical and demographic measures, with the exception of baseline drinks per drinking day (DDD). Those who dropped out had more DDD in the prior 90 days at baseline than those who were retained ($M = 11.3$ vs. $M = 9.0$, respectively, $p < .05$). However, only for men was DDD significantly higher for noncompleters than completers ($M = 13.1$, $SD = 10.8$, and $M = 10.3$, $SD = 8.6$, respectively, $p < .05$). For women, baseline DDD did not differ significantly between completers and noncompleters ($M = 6.6$, $SD = 4.4$, and $M = 7.5$, $SD = 4.3$, respectively).

Subjects

Table 1 summarizes the demographic and clinical characteristics of the sample. The overall sample was, on average, 42 years of age, and 34.8% were women. Respondents had completed 14.5 years of education. Most (80.4%) were White, 38.4% were married or living with a significant other, and more than half (58%) were employed.

TABLE 1. Baseline demographic and clinical variables by gender

Variable	Male ($n = 180$)	Female ($n = 96$)	Total ($n = 276$)
Demographics			
Age, in years, M (SD)	44.9 (12.4)	42.8 (13.9)	44.2 (12.9)
Race, White/other ^a , %**	75.0 / 25.0	90.6 / 9.4	80.4 / 19.6
Education, in years, M (SD)*	14.2 (2.5)	15.0 (2.2)	14.5 (2.4)
Marital status, %			
Never married	31.7	27.1	30.1
Married/living together	34.5	45.9	38.4
Separated/divorced/widowed	34.0	27.0	31.5
Employed, %**	52.2	68.8	58.0
Clinical			
DDD in past 90 days, M (SD)***	10.3 (8.6)	6.6 (4.4)	9.0 (7.6)
SIP score, M (SD)	21.3 (12.1)	19.1 (10.2)	20.5 (11.5)
No. of psychiatric symptoms, M (SD)	23.9 (13.6)	22.2 (11.3)	23.3 (12.9)
NEO Extroversion Subscale, M (SD)**	25.0 (7.7)	28.3 (7.7)	25.7 (8.0)
No. of previous treatment episodes, M (SD)	2.3 (4.2)	1.9 (10.3)	2.2 (6.9)
Recent substance use treatment, %	22.7	20.9	22.0
AA member T2, %	35.0	36.7	35.6
Achieved 1-year sobriety T3, %	33.3	29.2	31.9

Notes: **Bold** indicates statistical significance. All variables were measured at baseline with the exception of Alcoholics Anonymous (AA) membership and substance use treatment, which were measured at Time 2 (T2) (at the 1.5-year follow-up), and 1 year of sobriety, assessed at T3 (2.5- to 3-year follow-up). DDD = drinks per drinking day; SIP = Short Inventory of Problems. ^aOther includes the following: for men, 33 Black, 5 Hispanic, 4 Native American, 2 Asian, 9 multiracial, and 2 other participants; for women, 5 Black, 1 Hispanic, 3 multiracial, and 2 other participants.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Measures

Baseline variables. The NEO Five-Factor Inventory (Costa and McCrae, 1985, 1992), a 60-item measure of a well-established model of personality, uses five subscales to measure five major domains of personality: neuroticism, extroversion, openness, agreeableness, and conscientiousness. The current study used the NEO's extroversion subscale. Extroverts are described by the architects of the measure as sociable, assertive, active, and talkative individuals who like people and prefer large gatherings and groups. Introverts are characterized by an absence of the extrovert's qualities; they are reserved, are independent, and may prefer to be alone than in groups (Costa and McCrae, 1992). Sample items from the extroversion subscale include, "I like to have a lot of people around me"; "I really enjoy talking to people"; "My life is fast paced"; and the following items, which are reverse-coded: "I would rather go on my own way than be a leader of others" and "I usually prefer to do things alone." The measure uses a 5-point Likert-type response format (1 = *strongly disagree* to 5 = *strongly agree* for each item). Higher scores indicate higher levels of extroversion.

The Timeline Followback Interview (Sobell et al., 1992, 1996) was used to collect drinking data from which average DDD and days since last drink were calculated. These data were collected every 3 months by interviewers trained with the Timeline Followback video and supervised by one of the authors (E.A.R.R.).

Negative consequences of drinking were measured by the Short Index of Problems scale (Forcehimes et al., 2007; Miller et al., 1995), a 15-item measure that asks about several negative consequences of drinking. The scale uses a 4-point Likert-type response format (0 = *never*, 3 = *daily or almost daily*), yielding a range of scores from 0 to 45.

Psychiatric severity was measured by the Brief Symptom Inventory (Derogatis and Melisaratos, 1983), a 53-item self-administered instrument. The current study used the Positive Symptom Total Global Index, which is a count of the total number of items endorsed (range 0–53).

The number of previous episodes of substance use treatment was calculated by asking respondents at baseline, "Have you ever been in treatment before for your alcohol problem?" and, if yes, "How many times?"

Follow-up variables. Length of sobriety was assessed at the final interview (T3) using the days since last drink variable and dichotomized as follows: individuals with 365 or more days since their last drink or other drug use formed the 1-year-of-sobriety group; all others formed the group who had not achieved 1 year of sobriety. We chose this wave to measure the final outcome because it is the most distal follow-up wave and seems to provide the most stringent test of the longitudinal associations between extroversion, AA membership, gender, and sobriety. Sobriety was chosen because we judged it to be the best and most appropriate

drinking metric for successful AA membership. One year of sobriety was selected because it is a threshold identified in the literature as being a significant sobriety marker. The Betty Ford Institute Consensus Panel (2007, 2009) defined the 1-year mark as the threshold between early and sustained recovery. The *Diagnostic and Statistical Manual of Mental Disorders, Text Revision, Fourth Edition* (American Psychiatric Association, 2000), also uses the 1-year mark as the threshold between early remission and sustained remission.

AA membership status was assessed using an adapted version of a question from the Alcoholics Anonymous Involvement scale (Tonigan et al., 1996) when administered at the 1.5-year follow-up interview (T2). The question "Have you ever considered yourself to be a member of AA?" (Tonigan et al., p. 80) was adapted by us to read as follows: "Do you currently consider yourself to be a member of AA?" The time interval for this question referred to the previous 90 days. The variables of interest were selected to be time lagged to provide stronger evidence for possible causation. To summarize, extroversion was measured at baseline (T1), AA membership at the 1.5-year follow-up (T2), and 1 year of sobriety at the 2.5- to 3-year follow-up (T3).

Substance use treatment at the 1.5-year follow-up was used as a covariate in our analyses. To calculate the number of inpatient substance use treatment days, participants were asked, "Since your last interview (either telephone or in person) with us on [date of previous interview], did you spend any time in a hospital or in a treatment program where you stayed overnight? How many nights?" This was asked with reference to "residential substance use treatment or detoxification." To calculate the number of outpatient treatment days, participants were asked, "During this period, how many days did you have a session with a counselor or therapist? How many were for substance use treatment?" To calculate the dichotomous covariate used in the current analysis, participation in an inpatient or outpatient substance use treatment day was coded 1 and the absence of treatment was coded 0.

Data analysis plan

Differences between men and women in baseline demographic and clinical variables were assessed using *t* tests or chi-square analyses. Correlations were run on the primary variables in this analysis (gender, extroversion, AA membership, and sobriety outcome) and all variables significantly different by gender. Next, a series of multiple logistic regression analyses were conducted to test the main and interactive effects of gender, T2 AA membership, and baseline extroversion on sobriety status at T3. The framework provided by Jaccard (2001) for testing interaction effects in logistic regression guided our analyses. We designated AA membership as the focal independent variable, gender as the first-order moderator variable, and extroversion as the

TABLE 2. Correlations between measures

Measure	1	2	3	4	5	6	7	8
1. Gender	–							
2. Extroversion ^a	.20**	–						
3. Sober a year ^b	-.04	-.07	–					
4. AA member ^c	.02	-.06	.34**	–				
5. Employed	.16**	.28**	-.11	-.09	–			
6. Education	.15*	.05	-.01	-.08	.21**	–		
7. Race	-.19**	.00	-.08	-.05	-.17**	-.23**	–	
8. Drinks per drinking day ^a	-.23**	-.14*	.10	.26**	-.22**	-.26**	.12*	–

Notes: Gender, sober a year, AA member, race, and employed are dummy variables where female = 1; sober a year = 1; AA member = 1; White = 0, other race = 1; and employed = 1. AA = Alcoholics Anonymous. ^aAt baseline; ^bat the final follow-up (2.5–3 years after baseline); ^cat the 1.5-year follow-up.
* $p < .05$; ** $p < .01$.

second-order moderator variable. Extroversion was mean centered before forming product terms for the two- and three-way interactions. Also, to minimize the possibility of spurious associations, the following demographic and baseline clinical covariates were included in all models: age, race, education, employment status, marital status, DDD, drinking severity, number of psychiatric symptoms, number of previous treatment episodes, and substance use treatment at T2. Significant interactions were decomposed and graphed to display the relationship of the variables to the probability of achieving a year of sobriety.

Results

At T2, approximately one third (35.6%) of subjects considered themselves members of AA. At T3, about one third (31.9%) had achieved at least 1 year of sobriety (Table 1). The percentage of individuals who identified as AA members and who achieved a year of sobriety did not differ by gender. Among AA members at T2, 50.9% of men and 60.6% of women were sober a year at T3.

At baseline, several demographic and clinical variables were statistically different by gender (Table 1). Women were more likely to be White, were more educated, and were more likely to be employed than men. At baseline, women had

their last drink more recently, but when they did drink, they drank less than men. As predicted, women had higher scores on the NEO extroversion subscale than men. No significant gender differences were found in the number of psychiatric symptoms and drinking consequences.

Table 2 displays bivariate correlation analyses, including gender, T2 AA membership, and T3 sobriety status, as well as baseline extroversion and the other variables from Table 1 that were significantly different by gender. Extroversion was positively correlated with employment ($r = .28, p < .01$) and negatively correlated with DDD ($r = -.14, p < .05$). DDD at baseline was positively correlated with AA membership 1.5 years later ($r = .26, p < .01$).

AA membership and the odds of achieving a year of sobriety: Gender differences

Table 3 displays the results from logistic regression analyses of the main and interactive effects of the focal variables of interest (T2 AA membership, gender, and extroversion) as predictors of subsequent achievement of a year of sobriety at T3. Consistent with Hypothesis 1, there was a statistically significant association between AA membership at T2 and sobriety at T3. Specifically, the odds of achieving a year of sobriety at T3 were more than four times greater for T2 AA

TABLE 3. Main and interaction effects of gender, extroversion, T2 AA membership on T3 sobriety

Variable	Model 1			Model 2			Model 3		
	OR	[95% CI]	<i>p</i>	OR	[95% CI]	<i>p</i>	OR	[95% CI]	<i>p</i>
AA membership	4.38	[2.25, 8.52]	.000	2.79	[1.24, 6.24]	.013	2.77	[1.23, 6.22]	.014
Female	0.84	[0.44, 1.60]	.595	0.40	[0.15, 1.04]	.061	0.40	[0.15, 1.04]	.061
Extroversion	0.98	[0.94, 1.03]	.420	0.97	[0.92, 1.03]	.346	0.97	[0.92, 1.03]	.381
Female × AA Membership				4.42	[1.14, 17.18]	.032	4.42	[1.14, 17.18]	.032
Female × Extroversion				0.98	[0.90, 1.07]	.641	0.97	[0.86, 1.10]	.667
Extroversion × AA Membership				1.04	[0.96, 1.13]	.321	1.04	[0.94, 1.15]	.458
Female × AA Membership × Extroversion							1.01	[0.85, 1.21]	.888

Notes: All models control for baseline age, race, education, employment status, marital status, drinks per drinking day, drinking severity, number of psychiatric symptoms, number of previous treatment episodes, and substance use treatment at the 1.5-year follow-up. Gender and extroversion were measured at baseline (Time 1 [T1]). Alcoholics Anonymous (AA) membership and substance use treatment were measured at the 1.5-year follow-up (T2). Sobriety was measured at the final follow-up, 2.5–3 years after baseline (T3). **Bold** indicates statistical significance. OR = odds ratio; CI = confidence interval.

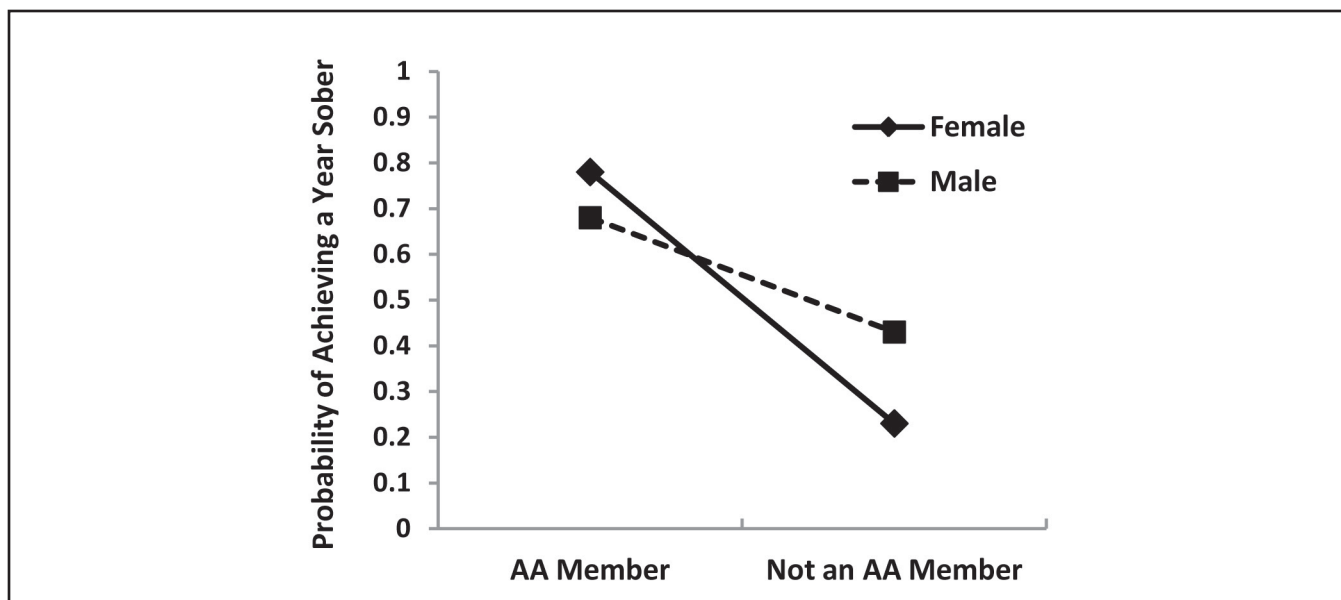


FIGURE 1. Probability of achieving a year of sobriety by gender and Alcoholics Anonymous (AA) membership status

members than non-AA members. There were no main effects of gender or extroversion. None of the covariates was significant.

To test Hypothesis 2, we calculated product terms to reflect all possible two-way interaction effects, including Gender \times T2 AA, Extroversion \times T2 AA, and Gender \times Extroversion. Covariates and predictors were entered into the equation first, followed by the product terms. The results from multiple logistic regression analysis showed that the two-way interaction between gender and T2 AA membership was statistically significant, indicating that the association between T2 AA membership and T3 sobriety was different for women and men. Specifically, as seen in Table 3, the impact of T2 AA membership on the odds of achieving a year of sobriety at T3 were more than four times greater for women than for men. Figure 1 depicts a decomposition of the interaction term. To produce this graph, equations using the betas for gender, AA membership, and their interaction from the logistic regression model were calculated to produce a y-axis value representing the logit, or predicted log odds, of achieving a year of sobriety, which was then converted to the probability of achieving a year of sobriety. The two-way interaction between extroversion and T2 AA membership was not statistically significant, indicating that the association between T2 AA membership and T3 sobriety did not vary as a function of extroversion.

The impact of AA membership on sobriety as a function of gender and extroversion

To test Hypothesis 3, we calculated a product term for the three-way T1 Extroversion \times T2 AA Membership \times Gender

interaction. Results showed that the three-way interaction between gender, T1 extroversion, and T2 AA membership was statistically nonsignificant. These results do not support the hypothesis that the moderating effect of gender on the association between T2 AA membership and T3 sobriety varies as a function of extroversion.

Discussion

The main findings of this study provide mixed support for our hypotheses. Consistent with our first hypothesis, T2 AA membership significantly predicted the odds of achieving a year of sobriety at T3. Consistent with our second hypothesis, this relationship was significantly stronger for women. Although this finding replicates previous findings that women's relationship with 12-step programs is stronger than men's (Bodin, 2006; Del Boca and Mattson, 2001; Weisner et al., 1995, 2003), it is important to note that studies vary in the ways in which they operationalize 12-step associations and, if assessed, drinking outcomes. First, some studies examine AA only, whereas others study mutual help involvement more broadly. Further, the measure of meeting attendance can vary between counting the number of meetings attended (Bodin, 2006) to attending at least one meeting versus none at all (Weisner et al., 1995). Various aspects of involvement have also been measured, such as calling an AA member for help, having a spiritual awakening, and reading AA literature (Bodin, 2006) or having a sponsor and doing at a minimum Steps 1 through 3 (Kingree, 1997). Our work adds to the literature by studying self-endorsed AA membership and a drinking outcome based on abstinence, in keeping with AA's stated

purpose of stopping drinking all together (rather than on, for example, reducing drinking).

Our study contributes to a subgroup of the body of work on gender and AA that uses longitudinal data to look at gender differences in the ways in which AA affects drinking. Our findings are in line with the work of Timko et al. (2002), who found that the number of AA meetings attended is a stronger predictor of favorable drinking outcomes for women than for men. Our results diverge from those of Kelly et al. (2006), who found that although mutual help was associated with more abstinence and lower levels of DDD, gender was not a factor.

In short, studies on gender and 12-step experience remain small in number and mixed in terms of measurement strategies and findings. Considering the wide variety of ways in which the constructs are operationalized throughout the literature, further research is necessary to understand the inconsistencies in the findings and reasons for gender differences when they occur. One avenue of inquiry could explore the role of race and social class as it relates to gender. The one study that found that men were more involved in AA than women assessed an indigent population. Other research examined individuals who might be primarily from the middle classes, such as members of a health maintenance organization (Kelly et al., 2006), which may indicate an insured versus an uninsured population.

Investigators have speculated about why gender differences are observed in the effects of AA on sobriety. Timko (2008) described how AA offers abundant opportunities for affiliation and is based on "trust, consensus building, and cooperation" (p. 375), which she posits are structural characteristics of the organization that may be fundamentally more compatible with women than men. Similarly, Kelly et al. (2011) describe how AA can satisfy an "affiliative need and desire for secure attachment" (p. 459) that may also resonate more with women than with men. We believe that these are plausible reasons for the stronger effects of AA among women. Other authors describe the ways in which female alcoholics differ from female nonalcoholics and from men along various dimensions such as self-esteem and external versus internal locus of control (Beckman, 1993). More work studying these characteristics and their influences on gender differences in 12-step experiences is warranted.

Although an estimated odds ratio of 4.4 suggests that female AA members are more than four times as likely as male AA members to stay sober for 1 year, the relatively wide confidence interval (1.1 to 17.2) indicates that this estimate is somewhat imprecise (Cumming and Finch, 2005), albeit statistically significant. Replication of this study with larger samples will clarify the nature of the interaction between gender and AA membership in the prediction of drinking outcomes.

Contrary to our third hypothesis, the differences between men and women on the impact of AA membership on sobri-

ety did not vary as a function of extroversion. This finding diverges from the work of Thevos et al. (2000), who found that women with social phobia did more poorly in a 12-step environment than they did in cognitive behavioral therapy. One reason our findings may have diverged is that although extroversion and social phobia are related constructs, perhaps they cannot be considered synonymous in the ways in which they function in relationship to gender and AA. Similarly, our findings may have diverged because AA membership and 12-step facilitation psychotherapy are related but different constructs. Outcomes in the current study (1 year of sobriety) and outcomes in the Thevos et al. (2000) study (time to relapse) are also similar but not identical. There are other contrasts between the two studies, such as sample and sampling differences, variations in the follow-up time points, and the nature of the time-lagged variables.

Basically, we found that extroversion had no main effect in predicting sobriety, no impact on the relationship between AA membership and sobriety, and no impact on the moderating effect of gender on the relationship between AA membership and sobriety. Therefore, our study suggests that those who are higher and those who are lower in extroversion both have equal access to the benefits of AA membership in terms of abstinence. What does this mean, given that AA is such a social, outgoing program, offering a bevy of extroverted situations and activities to participants? One study provides a possible answer. Fleenon et al. (2002) studied the effect of extroverted activities on feelings of well-being. The researchers conducted three related studies, all of which provided evidence of a within-person correlation between extroverted activities and positive affect. In their study, acting extroverted increased the degree of positive affect for all subjects. This was shown to occur several times throughout a day and was broadly categorized over a week's time. The study suggests that the association of within-person extroversion and positive affect holds for all individuals, not only those with trait extroversion. In summary, acting extroverted can increase positive affect for those with both greater and lesser degrees of extroversion. Applying this finding to the current analysis, one might hypothesize that the extroverted activities of AA increase positive affect for both extroverts and introverts, making trait extroversion, such as that measured in this study, less related to reaping the full benefits of the AA experience.

Studies of AA are challenged by self-selection bias. Another reason for the lack of an effect of extroversion in the current study could be co-occurring characteristics of individuals who self-select into AA that might override the characteristic of extroversion, such as motivation for change or desire for sobriety.

The study has several limitations that should be considered when interpreting its results. It is based on a convenience sample and thus may not generalize to the full population of individuals with alcohol use disorders.

However, the sample was drawn from four very different recruitment sources that varied by socioeconomic status and drinking goals; therefore, convenience was tempered in part by a heterogeneous sample. Another important limitation is that drinking outcomes were based on self-reports without biochemical corroboration or collateral reports. We found that male study dropouts had more DDD at baseline than those who were retained in the current study for analysis. This has important limitations in terms of generalizability but is somewhat mitigated by the finding that there were no differences between the women who dropped out and who were retained. Finally, AA membership identity was limited to a dichotomous variable that assessed the 90 days before the 1.5-year follow-up. Accordingly, individuals in the non-AA group may have never attended AA, or they may have attended at a previous time point and dropped out. These differences were not examined. Further, we were unable to control for site differences in our statistical analyses because each site was not sufficiently populated by gender, AA membership, and sobriety outcome.

This study found that extroversion has no impact on the relationship between AA membership and sobriety. Therefore, AA works equally well for less extroverted men and women as it does for more extroverted men and women. Future studies can investigate the AA experiences of individuals with lower levels of extroversion to see if Fleeson et al.'s (2002) explanation holds with this population; that is, do the extroverted activities of the AA experience have a positive impact on both more and less extroverted members? Does the impact of extroversion vary when studying a range of AA activities that may reinforce sobriety, such as being a sponsor, having a home group, doing service, and helping others? Another interesting area of investigation would be the impact of AA participation on extroversion and even social phobia. It is possible that repeated positive and supportive exposure to outgoing social interaction can have the effect over time of increasing extroversion and reducing social phobia. In summary, AA membership improved the odds of sobriety for men and women, and these odds were more than four times higher for female AA members than male AA members. Further, baseline extroversion in this study was not related to the relationship between AA membership and sobriety. Future research should clarify the mechanisms underlying the differential effects of AA among women and men.

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