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Examining the relationship between the Big Five, Grit and avoidance of automated communication scales in adults 40–65

Katheryn R. Christy, Ph.D[1] and **Jakob D. Jensen, Ph.D.**[2]

[1]University of Wisconsin-Madison

[2]University of Utah

Abstract

Automated communication technologies (ACTs) have largely become commonplace in day to day life. Although these technologies are widely used, there is a not insubstantial proportion of the population that prefers to avoid contact with ACTs. Recently, a scale was developed to assess dispositional avoidance of automated communication technologies. The current study provides validation of the scale in an older adult population and demonstrates that the avoidance of automated communication scale can be discriminated from personality measures, including the Big Five and Grit, and is predictive of avoidance of ACTs.

Keywords

automated communication; human-computer interaction; automation

Automated communication technologies (ACTs) have largely become commonplace in day to day life. Shoppers may check themselves out at an automated self-checkout station in the grocery store. Patients may be checked in and a personal history gathered by a virtual nurse. Everyone has had an experience with an automated telephone system designed to facilitate the collection of customer data prior to transferring the call to a customer service representative.

Although these technologies are widely used, there is a not insubstantial proportion of the population that prefers to avoid contact with ACTs (Christy et al. forthcoming; Reppenger & Phillips, 2009; Whitworth, 2005). Recently, a scale was developed to assess dispositional avoidance of automated communication technologies (the AAC; Christy et al. forthcoming) in the hopes of identifying those who are high in AAC and determining what features of ACTs either facilitate or inhibit their experiences. It was found that AAC is consistently higher in older individuals (those older than 45). As such, further validation of the AAC within this population was recommended (Christy et al. forthcoming). Additionally, although previous measure validation suggests that the AAC can be discriminated from general perceptions of ACTs (e.g., perceived usefulness), it is unclear whether or not the AAC can be successfully discriminated from other personality traits that may influence reactions to automated communication technologies. For example, the openness dimension of the Big Five personality model reflects a tendency to respond positively to novel experiences, which could impact reactions to new communication technologies, including

ACTs. Finally, initial studies of AAC have focused heavily on health contexts; in order to successfully demonstrate the generalizability of the AAC it must be tested in other contexts.

Therefore, the aims of the current study are threefold: 1) to validate the AAC in an older population; 2) to demonstrate discriminant validity between the AAC and a variety of personality measures; and 3) to show that the AAC is predictive of avoidance of automated communication in non-health contexts.

Avoidance of Automated Communication

Automated communication technologies (or ACTs) have become increasingly common across a wide variety of domains, including health (Bickmore, Pfeifer, & Paasche-Orlow, 2009; Flodgren, Rachas, Farmer, Inzitari, & Shepperd, 2015; Lam, Varona-Marin, Li, Fergenbaum & Kulić, 2016; Piette et al., 2013), education (Bernardini, Porayska-Pomsta, & Smith, 2014; Kanda, Hirano, Eaton, & Ishiguro, 2004; Krämer et al., 2016; Tegos & Demetriadis, 2017; van der Meij, 2013) and commerce (Papsdorf, 2015; Sundar, Bellur, Oh, & Kim, 2014). Although technology is improving all the time, ACTs are often still viewed as somewhat flawed replacements for interpersonal interactions due to the difficulty of realistically replicating the complexity of human communications within the context of a computer program (Culley & Madhavan, 2013; Dey, 2009; Koulouri, Lauria, & Macredie, 2014; Moore, 2001; Whitworth, 2005). These flaws may cause some people to actively avoid interactions with ACTs (Reppenger & Phillips, 2009; Whitworth, 2005), a disposition referred to as avoidance of automated communication (AAC). More specifically, AAC is defined here as actively ignoring, skipping, or terminating messages that appear to originate from interactive communication databases. AAC, as conceptualized, is a dispositional trait that arises from personal, vicarious, or perceived experiences. Previous research has empirically discriminated AAC from general attitudes towards and comfort with ACTs—including use intentions and comfort with technology—and avoidant behavior (Christy et al. forthcoming). AAC is generally higher in older persons and is generally lower in individuals with social phobia (Christy et al. forthcoming).

The Current Study

As noted previously, the aims of the current study are to validate the AAC in an older population, to demonstrate discriminant validity between the AAC and a variety of personality measures, and to show that the AAC is predictive of avoidance of automated communication in non-health contexts.

AAC and Older Adults

The relationship between AAC and older adults found in previous research is somewhat troubling (Christy et al. forthcoming). ACTs are becoming more and more common, and as the population of the U.S. and other nations age avoidance of automated communications may pose ever increasing barriers to day to day life. As such, it is especially important to understand how measures of AAC perform in this population, in the interests of pinpointing ways of changing ACTs with a goal of decreasing AAC. Although the AAC was developed and tested within an adult sample (299 adults ranging from 18–90, with a mean age of 30.98

years, *SD* = 12.18; Christy et al. forthcoming), it was important to be sure that the scale performed similarly in a larger sample formed exclusively of older adults. Therefore, the current study focused specifically on adults age 40–65.

AAC, Personality, and Dispositions

Although the AAC has previously been demonstrated to be discriminant from a variety of technology perception measures, it is also important to determine whether or not the AAC captures variance unique to itself in the context of personality-based measures. AAC is theorized as a dispositional trait, and there are several other personality and/or dispositional measures that it potentially overlaps with.

The Big Five.—One of the most enduring and widely used conceptualizations of human personality is the Big Five (B5), sometimes also known as the five factor model (Goldberg, 1993; John, Naumann, & Soto, 2008; McCrae & John, 1992). This model broadly conceptualizes human personality as consisting of five different factors: openness, conscientiousness, extraversion, agreeableness, and neuroticism. Openness refers to one's disposition towards new experiences and information, as well as one's intellectual curiosity. Conscientiousness can be thought of as a tendency towards dutifulness, dependability, scheduling, and reliability. Extraversion is characterized by sociability, assertiveness, and high energy. Individuals high on agreeability are cooperative, kind, and trusting, while those high on neuroticism show a tendency toward emotional sensitivity and experiencing negative moods.

It is possible that the AAC scale is assessing openness or extraversion. Individuals who are open to new experiences may have few problems engaging with ACTs, while those who are highly sociable may actively avoid them due to a desire to communicate with a person, not a machine. It is unlikely, however, that the AAC is solely a measure of either of these constructs. Personality is, to some extent, heritable, suggesting that the factors that influence personality formation are at least somewhat linked with genetics, and also tends to be fairly stable in adults, increasing in stability up to age 30 and then remaining fairly stable for the rest of a person's life (McCrae, Gaines, & Wellington, 2012; Roberts, Donnellan, & Hill, 2012). AAC, on the other hand, is not conceptualized of as an inborn trait; instead, it is believed that a combination of personality, personal experiences, and other factors combine to form a dispositional tendency that may or may not remain stable throughout a person's life, depending upon what they experience.

Grit.—Individuals with a "gritty" personality are highly motivated to persevere to accomplish their long term goals (Duckworth, Peterson, Matthews, & Kelly, 2007). As such, they are more willing to face and overcome obstacles in order to achieve their goals (Duckworth et al., 2007; Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). For example, individuals high in grit are more likely to keep jobs, graduate from high school and college, and stay married (Duckworth et al., 2007; Eskreis-Winkler, 2014).

The AAC is conceptualized as assessing avoidance of ACTs, but it is possible that the AAC is simply identifying individuals low in grit. ACTs may be more frustrating to interact with than a human, and low grit individuals tend to avoid challenge and frustration (Von Culin,

Tsukayama, & Duckworth, 2014). However, grit tends to apply to all dimensions of a person's life (work, employment, schooling etc.), being a global disposition. AAC, on the other hand, is believed to be highly context specific, more an avoidance of one particular situation than an avoidance of challenge and frustration in general.

Conflict Avoidance.—Conflict avoidance is a passive conflict management behavior in which one avoids interpersonal conflict by either doing nothing or by avoiding the person, situations, or topics that were the origin of conflict (Pruitt & Rubin, 1986; Wang, Fink, & Cai, 2012). Although conflict avoidance is a behavior, it can also be considered a trait, with individuals demonstrating a fairly stable tendency to use or not use conflict avoidant strategies (Smith, Ciarrochi, & Heaven, 2008). Indeed, there is some evidence that tendency toward conflict avoidance has a neurological basis (Corr & McNaughton, 2012).

It is possible that there is a relationship between dispositional conflict avoidance and the AAC. Previous research found that individuals high in social phobia tended to have lower AAC (Christy et al. forthcoming), suggesting that those who experience anxiety related to interpersonal communication actually prefer interaction with ACTs. The same may be true in the case of conflict avoidance; those who prefer to avoid interpersonal conflict may also prefer using ACTs simply because the possibility of interpersonal conflict is non-existent in that context.

AAC and Context

Previous research on the AAC scale was conducted largely within the context of health-related ACTs, such as virtual nurses, electronic health records systems, and automated hospital check in/check out (Christy et al. forthcoming). However, as noted previously, ACTs are used in a wide variety of contexts including education and commerce. As such, the current study also aims to demonstrate the AAC's utility in explaining preferences for interpersonal vs. ACT interactions across a variety of contexts.

Methods

Sample

Adults (N = 398) age 40–65 (M = 56.65, SD= 6.86) were recruited via Qualtrics Panels to participate in the survey. Participants were predominantly male (n = 223, 56%, male coded as 0) and Caucasian/White (n = 321, 80.7%). For additional demographic data, please see Table 1.

Measures

The psychometric properties (i.e., mean, standard deviation, and alpha) for each scale can be found in Table 2.

Avoidance of automated communication (AAC).—The AAC was developed to assess dispositional avoidance of automated communication technologies (Christy et al. forthcoming; see Appendix A). It consists of nine items measured on a Likert type seven-point response scale, with higher scores indicating greater avoidance of ACTs. Sample items

include “I like the predictability of automated communication technology” and “I can never get the right information from automated communication technology systems.”

Because many participants may not have been familiar with the general concept of an ACT, this term was carefully defined in the instructions section and examples were provided. To help communicate the concept of automated communication systems, the survey provided several examples, such as that of customer service lines: “A good example is a 1–800 customer service line. When you call a 1–800 customer service line you often talk to a machine that answers your questions. That machine is a type of automated communication system.” The instructions also include the examples of ATMs and self-service checkouts at grocery stores. The instructions also tell participants that “In modern society, you encounter different types of automated communication all the time…When we say ‘automated communications’ in this study, we would like you to think of all of these things.”

Big five.—The ten item personality inventory (TIPI) developed by Gosling, Rentfrow, and Swann (2003) was used to measure the Big-Five personality traits: extraversion, conscientiousness, agreeability, neuroticism, and openness. Each trait was measured using two items assessed on a seven-point Likert type scale, and asked participants to rate the extent to which a set of paired traits applied to them. Sample items include “Extraverted, enthusiastic” and “Anxious, easily upset.” Previous research has demonstrated that the TIPI is an adequate substitute for longer Big-Five instruments, especially when the Big Five personality traits are not the primary focus of the research (Gosling, Rentfrow, & Swann, 2003)

Grit.—Grit was measured using Duckworth and Quinn’s (2009) short grit scale. Items were evaluated on a five-point scale anchored by *Not like me at all* and *Very much like me*. Sample items include “I am a hard worker” and “I finish whatever I begin.”

Conflict avoidance.—Dispositional tendency toward conflict avoidance was measured using Mutz and Reeves’s (2005) five item measure. Items were evaluated on a five-point Likert type scale. Sample items include “I feel upset after an argument” and “I enjoy challenging the opinions of others.”

ACT preferences.—Participants were also asked to assess several scenarios in which they might be able to either use an ACT or interact with a person. In each scenario, the two options (ACT and face-to-face interaction) were presented on the opposite ends of a seven-point scale, similar to a semantic differential scale. Participants were then asked to indicate which interaction they would prefer. The pairs provided were: ATM vs. Bank Teller; Computer hotel checkout vs. Front desk hotel checkout; Email from your doctor vs. face-to-face conversation with your doctor; and Automated phone system vs. Talk to a live operator. In each case, the ACT option was coded as (1) and the face-to-face/human interaction as (7).

Results

Confirmatory Factor Analysis

The AAC items showed significant multivariate abnormality, with skewedness = 24.96, Z-score = 36.61, p < .001, and kurtosis = 156.57, Z-score = 17.02, p < .001. This is typical of measures in social scientific research (Micceri, 1989). Very little data were missing (approximately only .1%), and were replaced using mean replacement.

A previous study (Authors, under review) suggested that the AAC scale is a nine-item scale with a single underlying latent variable. In order to confirm this factor structure, a confirmatory factor analysis (CFA) was carried out using Lisrel 8.8. Because the data were non-normal, CFA was run using the asymptotic covariance matrix with a Satorra-Bentler (S-B) χ^2 reported, which adjusts for non-normal distributions (see Satorra & Bentler, 2010). In addition to the S-B χ^2, which can be sensitive to sample size, five other fit indices were examined: χ^2/df ratio, CFI, RMSEA, SRMR, and Model AIC. The χ^2/df ratio adjusts for sample size by dividing the χ^2 by the degrees of freedom. Ratios below three indicate a good fit to the data (Kline, 2004). For CFI, conventional standards suggest .95 or higher to indicate good fit (Hu & Bentler, 1999). For RMSEA, .08 and lower indicates good fit (Holbert & Stephenson, 2008; Hu & Bentler, 1999). The Standardized RMR (SRMR) indicates good fit at .08 or lower (Hu & Bentler, 1999). The Model AIC is used to compare different models; lower scores indicate better fit (Akaike, 1987).

As in the previous study, the initial 9 item model was not a good fit for the data, S-B χ^2 (27) = 81.61, $p < .001$, χ^2/df ratio = 3.023, CFI = .98, RMSEA = .071, SRMR = .05, Model AIC = 117.61. A second model (see Figure 1) was run replicating the best fitting model from the previous study. In that model, the error terms for AAC5 and AAC6, AAC4 and AAC9, and AAC13 and AAC14 were allowed to be correlated. In line with Bentler (2010), the correlated error terms were a byproduct of language and phrasing overlaps between questions. For AAC5 and AAC6, both items asked participants to agree with an “often” statement (i.e., “often frustrating” and “often annoying”). AAC4 and AAC9 were both reverse worded statements that espoused a positive attitude towards AC (using “I like” phrasing), as opposed to dissatisfaction with AC. In the case of AAC13 and AAC14, both statements referred to a preference for a live person over an ACT. The revised model identified by Authors (under review) was tested with the current data. It produced an excellent fit, S-B χ^2 (24) = 41.22, p =.02, χ^2/df ratio = 1.72, CFI = .99, RMSEA = .04, SRMR = .034, Model AIC = 83.22.

Convergent and Divergent Validity

Bivariate correlations between the AAC and other measures were examined. The AAC scale was significantly related to age (r = .19, $p < .001$) and race (r = 14, p = .006). Older people tended to score higher on the AAC, while White/Caucasian people tended to score higher than non-White/Caucasian people. The only other measure the AAC was correlated with was openness (r = .13, p = .01); however, this relationship was in the opposite of the direction that might be expected. Participants who considered themselves more open to new experiences tended to also score higher on the AAC. Although this is puzzling, it does tend

to support the validity of the AAC as a unique construct as opposed to a general openness towards new experiences and technologies. The AAC was not correlated with any of the other dimensions of the Big Five, grit, or conflict avoidance. Again, this tends to suggest that the AAC is not simply another measure of personality, an indicator of overall self-efficacy, or a measure of an avoidant personality.

Discriminant Validity

A heterotrait-monotrait (HTMT) analysis was conducted to determine discriminant validity. The HTMT method is significantly more sensitive than the Fornell-Larcker criterion for assessing item cross loadings; in a study running a Monte Carlo simulation the Fornell-Larcker criterion failed to identify discriminant validity issues over 50% of the time and examining cross-loadings simply failed to identify discriminant validity issues (0%; Henseler, Ringle, & Sarstedt, 2015). In contrast, the HTMT approach was sensitive to problems with discriminant validity over 95% of the time (Henseler et al., 2015).

An HTMT analysis looks at the “heterotrait-monotrait (HTMT) ratio of indicator correlations, which is the average of the hetereotrait-heteromethod correlations…relative to the monotrait-heteromethod correlations...” (Henseler et al., 2015, p. 121). There are several criteria for assessing HTMT scores, but the most conservative suggests that if no value in the HTMT matrix is above .85, discriminant validity has been demonstrated (Henseler et al., 2015; Kline, 2011). SmartPLS (Ringle, Wende, & Becker, 2015) was used to compute the HTMT values for AAC, the five dimensions of the Big Five, grit, and conflict avoidance. As Table 4 illustrates, all HTMT values are below .85, demonstrating the AAC’s discriminant validity.

ACT Preferences

In order to determine whether or not AAC accounted for additional variance above and beyond demographics and the other dispositional measures, a series of hierarchical regression analyses were conducted. For each ACT preference, measures were entered into three blocks: 1) demographic variables, 2) dispositional measures, and 3) AAC. Across all four scenarios, AAC explained a significant amount of variance above and beyond the influence of demographics and other dispositions (see Table 5). As anticipated, higher AAC was consistently associated with a preference for interacting with a human over using an ACT.

Discussion

The present study provided further validation of the AAC scale within an older adult population. The 9-item factor structure established in previous studies was confirmed in the current study, as was the tendency for AAC to increase with age. Convergent and divergent validity found few relationships between the AAC and the B5, grit, and conflict avoidance, and the discriminant validity analysis showed that the AAC scale is significantly discriminant from all measures assessed.

The one measure the AAC scale did show a significant correlation with was openness. However, the relationship was opposite of the direction that might have been expected, with

higher AAC correlated with greater openness. There may be a few explanations for this relationship. The current study used a short measure of the B5 inventory, which consisted of two items for each dimension instead of the eight items commonly used in longer measures. Although previous research has shown that the relationship between the B5 short form and long form is strong (Gosling, Rentfrow, & Swann, 2003), the authors themselves note that openness is one of the dimensions that performs least well at capturing the full scope of the original measure. Additionally, the sub-dimension Spearman-Brown coefficients for all five dimensions were fairly low in this study. Future research should assess the AAC alongside the full B5 inventory in order to determine if the demonstrated relationship between the AAC and openness persists.

Although a previous study had already demonstrated the relationship between AAC and avoidance of ACTs within health contexts (e.g., virtual nurses, electronic health records; Authors, under review), these results suggest that the AAC is a suitable instrument for assessing avoidance of ACTs across a variety of contexts. The next step in understanding how AAC functions is to attempt to determine which features of ACTs, if any, increase or reduce avoidance. Given the continued relationship between AAC and age, identifying which features make ACTs more attractive to older populations may be especially important, given the fact that older adults tend to be in contexts where they are more likely to encounter ACTs (e.g., hospitals) and may be forced to rely on ACTs to a greater extent due to situational limitations (e.g., limited mobility, lack of transportation).

It is additionally interesting to note that AAC scores are significantly higher for White/Caucasian people than for non-White/Caucasian people (in this particular study primarily Black and Hispanic participants). One possibility is that this finding is the result of the White/Caucasian participants in this sample being older overall than the non-White/Caucasian participants, with the primary underlying factor driving the relationship between AAC and race being age. Indeed, the regression results from the ACT preference scenarios (see Table 5) demonstrate that of age and race, only age consistently shows any significant relationship with a preference for the interpersonal (as opposed to automated) option, as can be seen in the ATM vs. Bank Teller and Phone System vs. Operator scenarios. Future studies should continue to investigate the relationship between demographic variables, including age and race, and AAC.

Finally, additional research should continue to establish the psychometric properties of the AAC scale. Although the AAC scale is conceptualized as assessing a relatively stable disposition, test-retest reliability for the measure has not yet been established. Establishing a stable dispositional measure could then assist with the development of a state-based measure designed to assess AAC within the context of specific ACTs, which would be helpful for the development of ACT technologies, as well as help researchers learn how AAC develops over time.

Limitations

The current study was conducted with adults 40–65; as such, its results may not generalize to the population outside of that age range. The study was also survey-based; as such, it is not possible to use the current study's results to predict behavior or demonstrate causality.

Additionally, very few of the scales used in this study have been specifically designed for an older adult population, which may have influenced this study's findings. Future research is needed to determine if these scales are well suited for use in this population.

Conclusion

ACTs will only become more common as time goes on, and both researchers and developers of ACTs continue to attempt to improve current systems. The AAC provides a useful tool to help identify individuals that are being especially underserved by current technology. Being able to identify this population will help researchers and designers focus on those elements of ACTs that may be most important for increasing adoption of these new technologies. This is an important area of research, as those who are avoidant of or uncomfortable with ACTs will increasingly be at a disadvantage when performing day-to-day tasks as automation increasingly takes over tasks once performed by humans.

Acknowledgments:

Katheryn R. Christy (krchristy@wisc.edu) is an Assistant Professor in the School of Journalism and Mass Communication at the University of Wisconsin-Madison. Jakob D. Jensen (jakob.jensen@utah.edu) is an Associate Professor in the Department of Communication and the Department of Health Promotion and Education at the University of Utah. This research was supported, in part, by an R25 grant from the National Cancer Institute (R25 CA 090314). None of the authors have any financial interest or benefit arising from the direction application of this research. Correspondence concerning this article should be addressed to Katheryn R. Christy, 255 S. Central Campus Dr., RM 2400, Salt Lake City, UT 84117, tel- (801) 581–6888, kate.christy@utah.edu

Appendix A

AAC Items and Instructions *Participant Instructions*: We would like to assess your feelings about automated communication systems. What is an automated communication system? A good example is a 1–800 customer service line. When you call a 1–800 customer service line you often talk to a machine that answers your questions. That machine is a type of automated communication system.

In modern society, you encounter different types of automated communication all the time. ATMs are a form of automated communication system and so are self-service check-out lines at grocery stores. Recently, it has proposed that paper health records be replaced by electronic health records (EHR), and those may include an automated communication system as well (e.g., appointment reminders, personalized health messages). When we say "automated communication system" in this study, we would like you to think of all of these things.

1. I like the predictability of AC.* **4**
2. AC systems are often frustrating. **5**
3. It is often annoying trying to interact with AC systems. **6**
4. I can never get the right information from AC systems. **7**
5. I try to "get to a person" as quickly as I can when confronted with an AC system. **8**

6. I like the fact that AC systems are not in a hurry.* **9**
7. AC systems can often find information faster than a live person can.* **12**
8. I try to avoid AC systems. **13**
9. It is easier to get what I want from a live person **14**

Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Note: The bolded numbers following the items correspond with the item labels in Figure 1.

*Indicates reverse-coded item.

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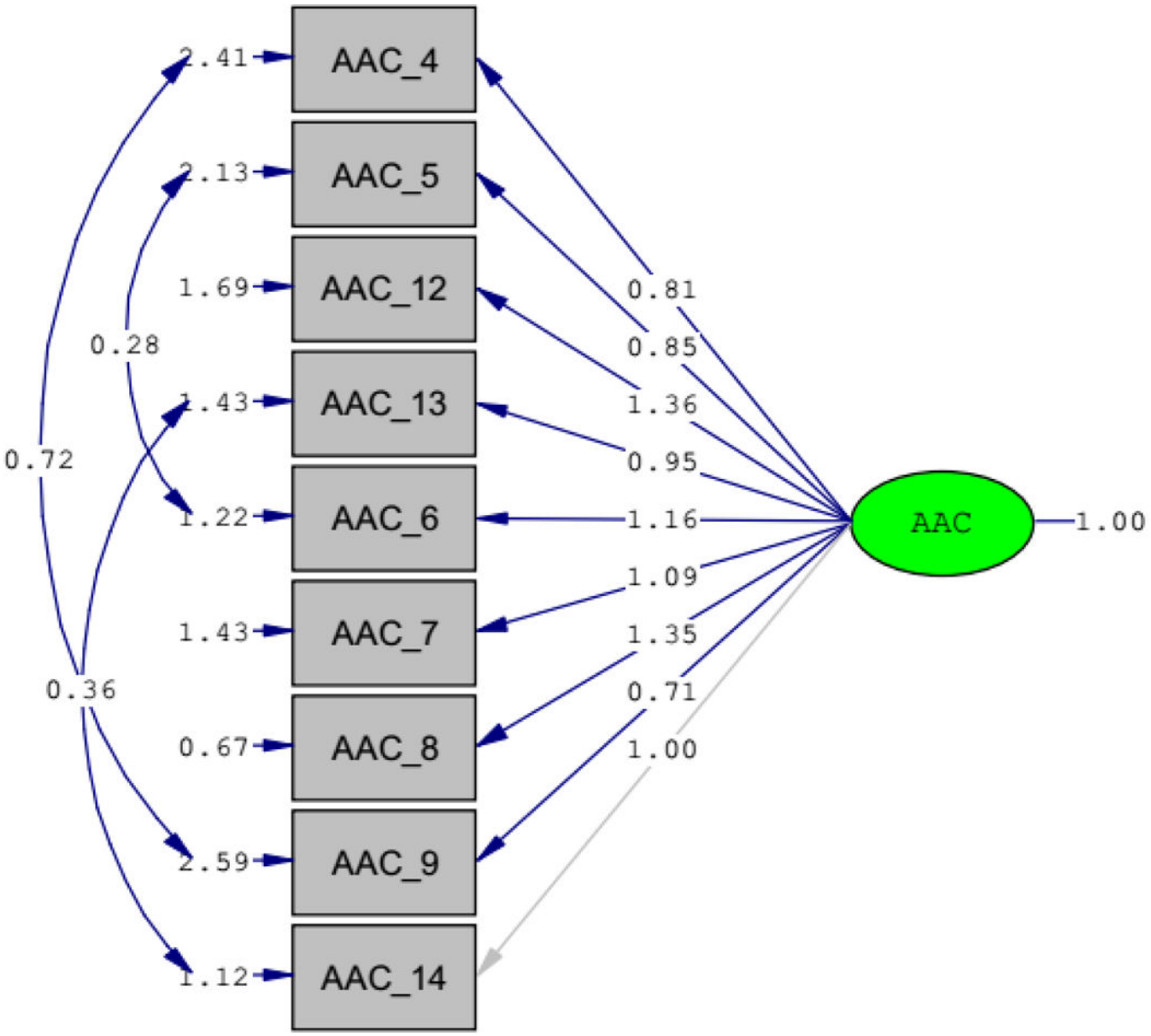

Figure 1. Confirmatory factor analysis of the AAC scale.
Item labels correspond with the bolded numbers following the items in Appendix A.

Table 1

Sample Demographics

	n	%
Race *		
Caucasian/White	321	80.7
Black	38	9.5
Hispanic	24	6.0
Asian	13	3.3
Indian	7	1.8
Pacific Islander	2	.5
Other	9	2.3
Education		
No High School	1	.3
High School	6	1.5
Some College	70	17.6
2 Year/Technical Degree	163	41.0
Bachelor's Degree	66	16.6
Graduate/Professional Degree	86	21.6
No Response	6	1.5
Income		
< $10,000/ year	10	2.5
$10, 000 – 14,999	19	4.8
$15,000 – 24,999	26	6.5
$25,000 – 34,999	60	15.1
$35,000 – 49,999	61	15.3
$50,000 – 74,999	82	20.6
$75,000 – 99,999	70	17.6
$100,000 – 149,999	42	10.6
$150,000 – 199,999	13	3.3
> $200,000/ year	10	2.5
No Response	5	1.3

* *Note*. Race percentage adds up to >100% because participants were permitted to select more than one race.

Table 2

Psychometric Properties for Measures

	M (SD)	α
AAC	5.30 (1.13)	.86
Extraversion	4.03 (1.53)	.64 (.64)*
Agreeableness	5.16 (1.17)	.37 (.38)*
Conscientiousness	5.90 (1.03)	.45 (.46)*
Neuroticism	5.02 (1.30)	.61 (.62)*
Openness	5.01 (1.14)	.39 (.40)*
Grit	3.67 (.56)	.73
Conflict Avoidance	3.55 (.79)	.81
ATM vs. Bank Teller	4.22 (2.44)	n/a
Computer Checkout vs. Front Desk Checkout	5.03 (2.26)	n/a
Doctor Email vs. Doctor Face-to-Face	6.08 (1.48)	n/a
Automated Phone System vs. Operator	6.05 (1.44)	n/a

**Note.* Items with a are followed by their Spearman-Brown coefficient.

Table 3

Bivariate Correlation Matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. AAC	-												
2. Age	.19*	-											
3. Sex	.03	−.04	-										
4. Race	.14*	.29*	.09	-									
5. Education	−.05	.05	.07	−.05	-								
6. Income	−.06	.06	−.17*	.09	.26*	-							
7. Extraversion	.06	.03	.11*	.00	−.02	−.01	-						
8. Agreeability	.01	.09	.17*	.02	.08	.01	.03	-					
9. Conscientiousness	.07	.11*	.06	.01	.09	.24*	.11*	.22*	-				
10. Neuroticism	.03	.06	−.01	−.14*	.08	.16*	.09	.42*	.39*	-			
11. Openness	.13*	−.01	.02	−.04	.04	.01	.41*	.23*	.22*	.27*	-		
12. Grit	.08	.13*	.04	.01	.08	.15*	.20*	.24*	.47*	.36*	.24*	-	
13. Conflict Avoidance	.06	−.01	.24*	.15*	−.02	−.03	−.11*	.30*	−.04	−.12*	−.15	−.08	-

*Note. $p < .05$

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Table 4

Heterotrait-Monotrait (HTMT) Discriminant Validity Results

	1.	2.	3.	4.	5.	6.	7.	8.
1. AAC								
2. Agreeability	.21							
3. Conflict Avoidance	.08	.54						
4. Conscientiousness	.20	.53	.14					
5. Neuroticism	.10	.84	.19	.75				
6. Extraversion	.11	.27	.15	.22	.23			
7. Grit	.19	.45	.16	.80	.52	.28		
8. Openness	.24	.64	.27	.55	.55	.82	.46	

Note. Scores lower than .85 represent discriminant validity. For example, the HTMT score between AAC and Cognitive Absorption is .51, well below .85.

Table 5

Hierarchical Regression Analyses for ACT Preference Scenarios

		ATM vs. Bank Teller		Computer vs. Front Desk		E-mail vs. Doctor		Phone vs. Operator	
		***B* (*SE*)**	***p***	***B*(*SE*)**	***p***	***B*(*SE*)**	***p***	***B*(*SE*)**	***p***
Block 1	Sex	.09 (.25)	.72	−.40 (.23)	.08	.10 (.16)	.54	.22 (.15)	.14
	Age	**.06 (.02)**	**.002**	.01 (.02)	.43	.00 (.01)	.99	**.05 (.01)**	**<.001**
	Race	.57 (.33)	.08	−.02 (.30)	.96	.38 (.20)	.06	−.04 (.19)	.79
	Education	−.13 (.12)	.28	−.00 (.11)	.99	**−.15 (.07)**	**.04**	.01 (.07)	.84
	Income	**−.16 (.07)**	**.02**	**−.30 (.06)**	**<.001**	−.07 (.04)	.11	**−.08 (.04)**	**.04**
	F(*df*), R^2	**$F(5,381) = 4.89$, $R^2 = .05$, $p < .001$**		**$F(5,381) = 5.67$, $R^2 = .06$, $p < .001$**		**$F(5,381) = 2.73$, $R^2 = .02$, $p = .02$**		**$F(5,381) = 5.18$, $R^2 = .05$, $p < .001$**	
Block 2	Sex	.06 (.27)	.82	−.42 (.25)	.09	−.10 (.16)	.54	.13 (.16)	.42
	Age	**.06 (.02)**	**.002**	.01 (.02)	.53	−.00 (.01)	.94	**.05 (.01)**	**<.001**
	Race	.42 (.34)	.22	−.01 (.31)	.98	.27 (.20)	.19	−.08 (.20)	.70
	Education	−.13 (.12)	.28	−.01 (.11)	.91	−.14 (.07)	.05	.02 (.07)	.78
	Income	−.13 (.07)	.06	**−.31 (.06)**	**<.001**	**−.09 (.04)**	**.02**	**−.10 (.04)**	**.01**
	Extraversion	−.04 (.09)	.64	−.04 (.09)	.64	−.06 (.06)	.31	.00 (.5)	.95
	Agreeability	.05 (.13)	.41	.04 (.12)	.74	−.01 (.08)	.92	−.06 (.08)	.47
	Conscientiousness	−.08 (.14)	.56	−.04 (.13)	.74	**.26 (.08)**	**.002**	.12 (.08)	.16
	Neuroticism	**−.24 (.12)**	**.04**	−.05 (.11)	.64	−.10 (.07)	.16	.00 (.07)	.99
	Openness	−.03 (.13)	.80	.07 (.12)	.55	.09 (.08)	.25	−.01 (.08)	.93
	Grit	.37 (.26)	.15	.35 (.24)	.14	.09 (.16)	.55	.17 (.15)	.28
	Conflict Avoidance	.09 (.18)	.61	−.01 (.17)	.96	**.38 (.11)**	**< .001**	.19 (.11)	.08
	F(*df*), ΔR^2	$F(12,374) = 2.68$, $\Delta R^2 = .02$, $p = .36$		$F(12,374) = 2.60$, $\Delta R^2 = .01$, $p = .88$		**$F(12,374) = 3.67$, $\Delta R^2 = .07$, $p < .001$**		$F(12,374) = 2.82$, $\Delta R^2 = .02$, $p = .34$	
Block 3	Sex	.09 (.25)	.74	−.39 (.24)	.11	−.08 (.15)	.61	.17 (.13)	.20
	Age	**.05 (.02)**	**.02**	−.00 (.02)	.82	−.01 (.01)	.27	**.02 (.01)**	**.02**
	Race	.31 (.33)	.35	−.13 (.30)	.68	.18 (.19)	.36	−.26 (.17)	.12
	Education	−.11 (.12)	.34	.01 (.11)	.96	**−.13 (.07)**	**.06**	.05 (.06)	.43
	Income	−.11 (.07)	.10	**−.28 (.06)**	**<.001**	**−.08 (.04)**	**.05**	**−.07 (.03)**	**.04**
	Extraversion	−.04 (.09)	.64	−.04 (.08)	.63	−.06 (.05)	.30	.00 (.04)	.92
	Agreeability	.10 (.13)	.45	.09 (.12)	.44	.03 (.08)	.67	.02 (.06)	.70
	Conscientiousness	−.10 (.14)	.48	−.06 (.13)	.63	**.24 (.08)**	**.002**	.09 (.07)	.19
	Neuroticism	**−.26 (.12)**	**.03**	−.07 (.11)	.53	−.11 (.07)	.10	−.03 (.06)	.67
	Openness	−.10 (.13)	.42	−.00 (.12)	.98	.03 (.08)	.67	−.12 (.06)	.05
	Grit	.34 (.25)	.18	.32 (.23)	.18	.07 (.15)	.66	.11 (.13)	.38
	Conflict Avoidance	.00 (.18)	.99	−.11 (.17)	.53	**.31 (.11)**	**.003**	.04 (.09)	.65
	AAC	**.43 (.11)**	**< .001**	**.47 (.10)**	**< .001**	**.36 (.07)**	**< .001**	**.72 (.06)**	**< .001**
	F(*df*), ΔR^2	**$F(13,373) = 3.77$,**		**$F(13,373) = 4.15$,**		**$F(13,373) = 6.03$,**		**$F(13,373) = 16.99$,**	

	ATM vs. Bank Teller		Computer vs. Front Desk		E-mail vs. Doctor		Phone vs. Operator	
	B (*SE*)	*p*	*B*(*SE*)	*p*	*B*(*SE*)	*p*	*B*(*SE*)	*p*
	ΔR^2 = .04, *p* < .001		ΔR^2 = .05, *p* < .001		ΔR^2 = .07, *p* < .001		ΔR^2 = .29, *p* < .001	