AUTISM
ADVERSE IMPACT STUDY
WHITE PAPER
EXECUTIVE SUMMARY

This report summarizes ongoing research procedures carried out by Good&Co as part of the development and continued validation of the Proprietary Psychometric algorithm (PPA).

Good&Co’s PPA is a bespoke psychometric measurement tool, steeped in decades of research into career and individual differences literature. It is based on psychobiological frameworks of personality, rooted in neuroscience and behavioral genetics.

Good&Co’s PPA is grounded in the ‘Big Five’ personality model and three additional factors that are highly relevant in the workplace: emotional intelligence (Empathy), Drive and Authority. The traits are measured using a statistically validated psychometric tool, custom-developed for assessing personality in the context of organizational culture.

This study discusses the empirical validation of Good&Co’s model with a neurotypically diverse sample, focusing on people formally diagnosed with autism. The PPA was found to replicate results from the academic literature, showing the same personality differences previously observed between diagnosed and non-diagnosed people. We illustrate that Good&Co’s PPA operates in a non-biased way across neuro diverse and neurotypical groups.
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1. INTRODUCTION

With companies increasingly using psychometric assessments during the hiring process to fit the right candidate to the right job, it is important that such assessments are equitable and non-discriminatory across different groups, not only for age, sex, race or sexual orientation, but also for neurotypical diversity. Individuals on the autistic spectrum, more than anyone, need to be sure there is a good job-fit for them if they are to maintain continued employment (e.g. Muller et al., 2003). At Good&Co, we believe that when the job fits well, work feels more like play. Our goal is to empower people with the information they need to make better, more informed career decisions, while also helping companies build happier, more productive workplaces. Good&Co’s user experience is founded on its quirky and hard to game question style, which provides a fun way to find out your workplace personality. This form of quiz, however, could be more difficult for adults with autism who generally require a more direct line of questioning. This report investigates the user experience of individuals with autism to ensure that the Good&Co app is equally understandable and useful for neurotypical and neurotypically diverse groups alike.

1.1. Literature Review

Adults with autism face many specific challenges when it comes to obtaining and sustaining employment (Hillier, Campbell, Mastriani, Vreeburg Izzo, Kool-Tucker, Cherry, & Beversdorf, 2007). Apart from getting past the interview stage (which has its own set of challenges), when compared to the general population, there is a tendency for autistic adults to be over-represented in casual employment (32% ASD sample vs. 21% national population), overqualified for a role (46% ASD sample vs. 21% national population), and be under-represented in senior organizational roles (6% ASD sample vs 13% population) (Baldwin, Costley, & Warren, 2014). This is despite high functioning adults with autism showing higher than average education levels and enhanced performance on certain tasks compared to the general population (Baldwin et al., 2014). While the reason for the increase is unclear, in the last fifteen years, prevalence rates of autism have grown (e.g. Brughe et al.,
2011; Baio et al., 2018) and currently stands at ~1% of the population in the UK and 1-2% in the US. Therefore, a large section of the population is being neglected. As a consequence, valuable skills are going to waste, such as attention to detail, precision (Muller et al., 2003), dependability, and being consistent (Hagner & Cooney, 2005). Moreover, a proportion of the population are also likely to suffer from mental health issues (ASPECT, 2013) as a result of lack of fulfillment and/or exclusion in a society where employment is integral to an individual’s status.

Why are adults with autism in this position? One possible reason is a lack of understanding and awareness in society regarding the issues faced by autistic adults. Following the promotion of films such as ‘Rainman’, many people likely have some knowledge of extremely high functioning autistic adults or savants who have unprecedented skills in a specific area. They may, at the other extreme, also be familiar with autistic children who suffer with an obvious developmental impairment, such as motor development, speech and language, and/or socialization difficulties which may impact learning ability and behavior. While there is some overlap with learning disability, approximately 60 percent of individuals with an autistic spectrum disorder (ASD) diagnosis have average or high levels of intelligence (Chakrabarti & Fombonne, 2005). Therefore, a large number of autistic adults without learning disabilities, who appear at first glance to function similarly to typically developed individuals, tend to fall under the radar generally, and in particular when it comes to accessing support services (National Audit Office, 2009).

A lack of understanding and awareness regarding autism not only leads to a bias against employing autistic adults in the first place, but also leads to a lack of support within the working environment for those who do gain employment. Social competency is one area where support is needed to retain autistic employees (ASPECT, 2013; Hagner & Cooney, 2005; Hillier et al., 2007). Apart from a tendency to exhibit unusual or repetitive behaviors, adults with autism are likely to find reciprocal social interactions and interpersonal communication challenging (5th ed.; Diagnostic and Statistical Manual of Mental Disorders; American Psychiatric Association; 2013). It is worth remembering however, that adults with autism are as varied as the general population, and so each individual is unique,
presenting a range of characteristics across the diagnostic spectrum. Many will likely have difficulty ‘reading between the lines’ and so for these individuals, clear, detailed instructions are necessary to obtain optimum task performance (ASPECT, 2013; Hagner & Cooney, 2005). Some will prefer not to be involved in customer facing tasks (Hagner & Cooney, 2005). In addition to social aspects of a role, some autistic adults will be subject to high sensitivity to sensory input (APA, 2013), which can make some working environments particularly challenging for those affected. These characteristics, while presenting challenges to the individual employee and employer, are not insurmountable and as has been shown, with some adjustment from employers, autistic adults can be accommodated in the same way as other typically developed adults with physical disabilities or other individual needs (Hagner & Cooney, 2005).

Another possible reason for under-employment stems from the difficulties with acceptance that adults with autism face in education, working environments and socially. In a large study \(n=304\) where autistic adults reported their experiences of education, employment and well-being, many described instances of teasing, bullying or social exclusion during education due to appearing different to the ‘norm’ (ASPECT, 2013). In some instances, instead of preventing the abuse, teachers and educational staff were complicit and/or the instigators. Similar negative experiences were also reported by the sample regarding employment. Around one third of respondents reported boring, repetitive or unfulfilling work. Some also experienced exclusion and communication difficulties. Health and well-being issues were also documented as impacting on their work performance. Respondents also reported a lack of sufficient instruction or support from management. A lack of support in education and employment, feeling lonely or ‘out of place’ and more extreme levels of exclusion are all factors which likely contribute towards the high levels of anxiety and depression reported by over 70% of the sample. Such adverse experiences likely impact self-esteem and resilience, making autistic adults reluctant to put themselves forward for the job-market.

To help overcome these challenges, researchers have initiated intervention programs to help with procuring and maintaining employment (e.g. Hendricks, 2009; Hillier et al., 2007).
These studies have shown that with enough support, adults with autism can be successful in finding and keeping a job. The kind of support needed includes, pre-placement coaching, such as help with preparing CVs, job-search and applications, mock interviews, evaluation of job-site to assess suitability, and travel to work destination. In-placement coaching is also needed to support autistic adults with onboarding and initial training, as well as social skills training. Once established in a role, regular catch-ups with the employee and supervisor can be useful to provide additional support as and when required. The literature has shown that taking account of individual characteristics, such as strengths, weaknesses, needs and interests can help to support adults with autism to gain successful and ongoing employment.

**Personality**

One aspect which goes towards providing the right help and support in job placement is job match (Hendricks, 2010). Matching a job to an individual’s personality, as well as with their skills, strengths, weaknesses and interests, can add more granularity in finding a suitable working environment. A considerable body of research has explored the contribution of personality factors, namely the ‘Big 5’, to job satisfaction and performance (e.g. Barrick & Mount, 1991; Barrick, Parks & Mount, 2005; Judge et al., 1999; Salgado, 1997) and vocational preferences (e.g. Larson et al., 2002). Personality is used as a core component of person-job fit in the majority of talent acquisition platforms. While fit to job is important for everyone, it is particularly so for adults with autism who require a more tailored approach to help them find sustainable employment.

Personality profiles have been shown to differ between individuals with autism and typically developed individuals (e.g. Austin, 2013; Schriber, Robins, & Solomon, 2014; Wakabayashi, Baron-Cohen, & Wheelwright, 2006). This is unsurprising given the degree to which autistic individuals have issues with social communication (Extraversion), are less inclined to embrace change (Openness to Experience), are unlikely to comply with social norms (Agreeableness), are easily distracted by sensory stimulation (Conscientiousness), and suffer with higher levels of anxiety and depression (Neuroticism) (APA, 2013). Compared with typically developed individuals, individuals with autism have demonstrated
higher levels of Neuroticism, and lower levels of: Extraversion (Austin, 2013); Conscientiousness (Wakabayashi et al., 2006); Agreeableness; and Openness to Experience (Schriber et al., 2014). Schriber and colleagues found differences for all five factors, and these findings replicated within autistic samples, showing no differences between autistic adults and children, or between individuals with higher or lower symptom severity. Contrary to studies conducted in a general population (e.g. Chandler et al., 1978; Pratto et al., 1994), where differences in gender have been established, Schriber and colleagues found no gender differences within and across autistic and non-autistic samples.

There has been some discussion in the literature regarding autism and suggested deficits in Theory of Mind and empathy (e.g. Gernsbacher & Pripas-Kapit, 2012). Studies have shown lower levels of empathy for adults with autism compared to typically developed adults (e.g. Baron-Cohen & Wheelwright, 2004). A genetic basis for empathy that correlated negatively with autism has also been found (Warrier et al., 2018). These deficits in empathy are likely due to difficulty in understanding others’ mental states rather than any lack of feeling for others (Warrier et al.). Gernsbacher and Pripas-Kapit maintain that as a minority group, autistic individuals are as likely as any other minority group to struggle with recognizing social cues of the majority group. This may indicate that individuals with autism are disadvantaged when it comes to understanding others’ thought processes rather than lacking in emotional empathy, and likely reflects this group’s issues with social communication (APA, 2013).
1.2. Model description

Previous research into the relationship between personality and job fit has been based on traditional personality assessments (e.g. Kristof-Brown, Zimmerman, & Johnson, 2005). Good&Co, in contrast, while drawing on established data, has evolved this approach to create a brief, engaging and hard to game question set, built on a large, agile, localized pool with multiple redundancies. We use a multifaceted approach, in which pattern-match typology is combined with dimensional score measurement and multiple levels of personality measurement (Good&Co Validation Study, 2017). In using this novel approach, where several alternatives for each item are available, our model is less subject to bias.

Good&Co framework is based on the well-established ‘Big Five’ personality model, which suggests that several underlying traits combine together to create five factors of personality: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (e.g. Norman, 1963). If someone is extrovert, for example, they might be friendly, assertive or energetic, in any combination. They do not, however, have to express all three components equally. In addition to the five factors, we also include three additional factors that are highly relevant in a work environment: emotional intelligence (Empathy), Drive and Authority. All eight factors are measured on a continuum.

Openness is characterized by intellectual curiosity, creativity and open-mindedness;
Conscientiousness is characterized by attention to detail, organization and industriousness;
Extraversion is characterized by sociability, assertiveness and energy;
Agreeableness is characterized by politeness, respect for others and social conformity;
Neuroticism (reversed Stability) is characterized by low resilience, restraint and self-esteem;
Authority is characterized by social dominance, change intolerance and need for control;
Drive is characterized by competitiveness, stress tolerance and challenge-seeking;
Empathy is characterized by compassion, fairness and emotional intelligence.
**Fair, engaging, unbiased and hard to game**

Good&Co’s model has a “quirky” question style which offers a number of advantages. By making the experience quicker and more engaging, we are able to collect and utilize vast quantities of data very rapidly. Our smaller number of items is additionally compensated for by the use of a 0-100 slider bar for responses, which allows considerably greater variation in scores for each item. Research supports the advantages of this: continuous rating scales have been shown to be more effective in capturing a realistic degree of variation than Likert-type scales (Russell & Bobko, 1992), while, even among Likert scales, a larger number of gradations is preferable (Finstad, 2010).

In addition, by choosing less direct, and therefore less “gameable” questions, with a bipolar “anchor”, the risk for social desirability bias is reduced. Most people aim to 'sell themselves' as effectively as possible in the workplace; as well as wanting to appear motivated, efficient and innovative, respondents tend to shy away from identifying themselves with qualities like emotional instability or lack of Empathy.

Most psychometric assessments are fairly easy to 'game' – if the question is 'do you like to solve problems creatively?' then it’s quite clear that the underlying trait being measured has to do with creativity. The unipolar structure of the question also implies that a low answer is 'bad' – the person is not creative.

Our dual-anchored questions have no negatives. Respondents are never 'not creative' or 'not motivated' – they are 'practical' or 'relaxed'; respondents are therefore more willing to embrace a trait honestly as their own. As a result, a number of our questions actually outperform the traditionally-phrased equivalents that we used as benchmarks.
2. VALIDATION STUDY

To establish the validity of the model within a sample of people diagnosed with autism, a study was conducted online using the first quiz in Good&Co’s app. Data were collected via Prolific.ac, a host platform allowing researchers to carry out demographic screening by age, sex, geographic location and autism diagnosis amongst a myriad of other characteristics. Prolific survey respondents are reimbursed fairly for their participation, and generally the platform is highly regarded by academic institutions as for having a reliable, high quality participant pool.

In the present study people diagnosed with autism were recruited by Prolific for the purpose of this study especially. This demographic characteristic was not included as a filter in Prolific previously.

Participants

On agreeing to take part in the study, respondents were asked whether or not they had received a formal autistic spectrum diagnosis. The sample consisted of 65 participants with a formal diagnosis and 105 without. Power analysis yielded a power estimate of 94% for this sample size (G*Power 3.1: Faul, Erdfelder, Lang, & Buchner, 2007). This estimate suggests that with a sample of this size we can be confident in the results 94 percent of the time.

The sample included 88 males and 77 females, of which 34 and 30 were diagnosed, respectively (5 participants preferred not to state their gender). The relatively equal number of males and females with a diagnosis (1.1 : 1), may seem unrealistic at first glance as the male-female diagnostic ratio has commonly been shown to approximate 4 : 1 (Whiteley et al., 2010). Epidemiological studies, however, suggest that male-female prevalence may be much lower, 2.5 : 1 (Kim et al., 2011) or 1.8 : 1 (Matilla et al., 2011). It is also suggested that females previously escaped diagnosis due to a difference in the expression of ASD symptoms (e.g. Mandy et al., 2012). The age of the sample ranged from 18-75 years with the majority of participants falling within the range of 18-54 years.
Out of 39 participants who indicated their diagnosis, 19 were described as having high functioning autism/Asperger’s syndrome; 6 were described as having autistic spectrum disorder; 11 were described as having autism comorbid with other syndromes such as attention deficit disorder or sensory processing disorder; 2 were described as having pervasive developmental disorder.

No significant differences were found between those with and without a formal diagnosis, for location (urban/residential/non-urban), education level, employment status, or duration in role. In line with previous findings, occupations of formally diagnosed participants were not confined to technical fields, and instead were evenly spread across 40 common occupations (ASPECT, 2013; Muller et al., 2003) with no obvious clustering around specific industries.

Participants were also grouped by their scoring on a measure of autistic traits (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) used to verify the extent of such traits within the sample. The sample consisted of 63 participants scoring above a screening threshold (≥ 26), and 107 below. The sample showed some, but not complete, overlap with participants who reported a formal diagnosis, see Figure 1 below. This result corresponds with previous research which suggests that while self-report scores on the AQ provided high sensitivity, it did not necessarily predict a formal diagnosis (Ashwood et al., 2016).

![Venn Diagram showing the degree of overlap between the diagnosed, non-diagnosed and the AQ groups](image)

Figure 1.
Measures

Demographics: In addition to age and gender, participants were asked about their employment status, occupation, and type of diagnosis.

Diagnosis: Participants were asked to indicate, ‘yes’ or ‘no’, whether they had received a formal clinical autistic spectrum diagnosis from a psychiatrist, psychologist, or other qualified medical specialist.

Autistic traits were measured using the Autism Quotient screening tool (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) to verify the extent of autistic traits within the sample and capture any undiagnosed participants who may also score highly on autistic traits. The measure consisted of 50 items, scored on a four-point scale ranging from 0 = ‘Definitely agree’ to 3 = ‘Definitely disagree’. The range of scores were collapsed to provide a dichotomous ‘agree/disagree’ 1/0 score and produce a total score out of 50. Example items included, ‘I prefer to do things the same way over and over again’, and ‘I enjoy social chitchat’. The AQ recommends a scoring threshold (Ashwood et al., 2016), for screening of scores ≥ 26.

Personality and workstyle were measured using Good&Co’s eight-factor model. In our analyses we take a more granular approach and look at groups of traits which are statistically aligned within the factors, as well as individual traits. Participants are given up to five variants of each quiz question, so they can choose which option is most appropriate (or understandable) to them. For example, when measuring Extraversion, a direct question would be: ‘You have a strong personality’: with the response on the slider scale ranging from ‘Not me’, to ‘Definitely me’. Whereas an indirect question would be: ‘Going with the flow’: with the response on the slider scale ranging from ‘Is the best way to go’, to ‘Only if I’m rowing’. On the basis of scores on the personality quiz, participants received a brief report describing their Workstyle.

Usability was assessed using a brief survey of five items scored from 0 = ‘No, not at all’ to 100 = ‘Yes, completely’. This was conducted once the respondents completed the personality
quiz and received their workstyle report. This survey assessed the usability of the personality quiz and the report. Example items shown in Table 2 included, ‘Were the questions in the personality survey easy to understand?’, and ‘Think about a workplace environment you would like. Is this quiz and workstyle description helpful in finding a job in that environment?’.

Analytic strategy

To assess a potential association between having autism and the variant of question selected in the 18-item quiz, chi-square analyses were conducted for each item and for each group: diagnosed vs. non-diagnosed; AQ screening threshold: above vs. below. A Bonferroni correction of $p \leq .003$ ($p = .05/18$) was set to correct for multiple testing within each group. We aimed to test whether people with autism were more likely to choose questions that are more direct / concrete in nature.

To assess potential differences in usability between groups, mean comparisons were conducted on the five usability items for each group: diagnosed vs. non-diagnosed; and AQ screening threshold: above vs. below. A Bonferroni correction of $p \leq .01$ ($p = .05/5$) was set to correct for multiple testing within each group.

To assess any differences in personality between groups and establish whether the model adversely impacts neuro diverse people, mean comparisons were conducted on the 18-item quiz between groups: diagnosed vs. non-diagnosed; AQ screening threshold: above vs. below. A Bonferroni correction of $p \leq .003$ ($p = .05/18$) was set to correct for multiple testing within each group.

Results

Analyses were conducted to assess whether participants with an autistic spectrum diagnosis ($n=65$) or who scored highly on autistic traits ($n=63$) selected different variants of the quiz items compared to undiagnosed ($n=105$) or lower scoring participants ($n=107$). The assumption was that people diagnosed with autism or those who scored above the screening threshold would choose questions that are more direct.
Across all groups (diagnosed vs. non-diagnosed; above vs. below the AQ screening threshold), the results showed no significant association between choice of question variant and whether participants had a formal autism spectrum diagnosis or scored above the AQ threshold, following multiple testing correction of \( p \leq .003 \) \( (p = .05/18) \). The majority of participants across groups selected the first option in the quiz, averaging at 89 percent for the non-diagnosed, 86 percent for the diagnosed, 91 percent for participants below the AQ screening threshold, and 84 percent for participants above the AQ threshold (see Table 1).

Table 1.

| Percentage of participants across the non-diagnosed, diagnosed and AQ screening groups who selected the first variant of question across the 18 quiz items |
|--------------------------------|----------|----------|----------|----------|
| **NON-DIAGNOSED** | **DIAGNOSED** | **AQ BELOW** | **AQ ABOVE** |
| Average percentage | 89       | 86       | 91       | 84       |
| Item 1 | 65       | 46       | 66       | 43       |
| Item 2 | 84       | 77       | 85       | 75       |
| Item 3 | 96       | 91       | 96       | 90       |
| Item 4 | 89       | 88       | 89       | 87       |
| Item 5 | 85       | 85       | 89       | 78       |
| Item 6 | 90       | 88       | 89       | 89       |
| Item 7 | 73       | 77       | 75       | 75       |
| Item 8 | 91       | 98       | 92       | 98       |
| Item 9 | 91       | 89       | 94       | 84       |
| Item 10 | 93      | 98       | 93       | 100      |
| Item 11 | 94      | 86       | 94       | 86       |
| Item 12 | 97      | 92       | 97       | 92       |
| Item 13 | 96      | 97       | 98       | 94       |
| Item 14 | 93      | 89       | 94       | 87       |
| Item 15 | 94      | 95       | 96       | 92       |
| Item 16 | 90      | 83       | 93       | 79       |
| Item 17 | 90      | 83       | 93       | 79       |
| Item 18 | 97      | 92       | 98       | 92       |

Average percentage = average percentage frequency of selecting the first option across items.

Usability

Analyses were conducted to compare usability between the diagnosed \( (n=65) \) and undiagnosed \( (n=105) \) participants; and between those above \( (n=63) \) and below \( (n=107) \) the AQ screening threshold. The results showed a positive reception from the sample across all
aspects of user experience, as mean scores for all items fell well above the midpoint (see Table 2). For the majority of items, no significant differences were found within the two comparison groups, following multiple testing correction of $p \leq .01$ ($p = .05/5$). The diagnosed group was, however, more likely than the undiagnosed group, to find the workstyle description helpful in finding a job they would like. While participants both above and below the AQ screening threshold found the questions easy to understand, the group below the threshold found the questions easier, this difference did not extend to the diagnosed participants who found the questions equally easy to understand.
Table 2.

Means, standard deviations (SD), and range of scores of the diagnosed, non-diagnosed, AQ threshold: Above and Below groups for the usability items

<table>
<thead>
<tr>
<th>Item</th>
<th>DIAGNOSED</th>
<th>NON-DIAGNOSED</th>
<th>AQ ABOVE</th>
<th>AQ BELOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were the questions in the personality survey easy to understand?</td>
<td>MEAN (SD) 75.29 (22.19)</td>
<td>MEAN (SD) 82.44 (18.72)</td>
<td>MEAN (SD) 74.02 (23.33)</td>
<td>MEAN (SD) 83.06 (17.65)</td>
</tr>
<tr>
<td></td>
<td>RANGE 22 - 100</td>
<td>RANGE 14 - 100</td>
<td>RANGE 21 - 100</td>
<td>RANGE 14 - 100</td>
</tr>
<tr>
<td>Is the description of your workstyles representative of your attitude towards work?</td>
<td>MEAN (SD) 74.23 (21.09)</td>
<td>MEAN (SD) 71.28 (20.26)</td>
<td>MEAN (SD) 75.03 (21.20)</td>
<td>MEAN (SD) 70.86 (20.13)</td>
</tr>
<tr>
<td></td>
<td>RANGE 1 - 100</td>
<td>RANGE 14 - 100</td>
<td>RANGE 1 - 100</td>
<td>RANGE 14 - 100</td>
</tr>
<tr>
<td>Would this quiz and workstyle description be helpful in finding a job you would like?</td>
<td>MEAN (SD) 72.94 (21.28)</td>
<td>MEAN (SD) 64.57 (21.70)</td>
<td>MEAN (SD) 70.86 (21.08)</td>
<td>MEAN (SD) 65.95 (22.20)</td>
</tr>
<tr>
<td></td>
<td>RANGE 1 - 100</td>
<td>RANGE 5 - 100</td>
<td>RANGE 1 - 100</td>
<td>RANGE 5 - 100</td>
</tr>
<tr>
<td>Think about a workplace environment you would like. Is this quiz and workstyle description helpful in finding a job in that environment?</td>
<td>MEAN (SD) 69.32 (23.57)</td>
<td>MEAN (SD) 63.68 (20.64)</td>
<td>MEAN (SD) 65.54 (23.74)</td>
<td>MEAN (SD) 66.01 (20.87)</td>
</tr>
<tr>
<td></td>
<td>RANGE 1 - 100</td>
<td>RANGE 5 - 100</td>
<td>RANGE 5 - 100</td>
<td>RANGE 1 - 100</td>
</tr>
<tr>
<td>Would this quiz and workstyle description be helpful for employers to have a better understanding of your work style?</td>
<td>MEAN (SD) 75.58 (22.74)</td>
<td>MEAN (SD) 68.77 (22.60)</td>
<td>MEAN (SD) 74.51 (20.31)</td>
<td>MEAN (SD) 69.53 (24.09)</td>
</tr>
<tr>
<td></td>
<td>RANGE 2 - 100</td>
<td>RANGE 1 - 100</td>
<td>RANGE 11 - 100</td>
<td>RANGE 1 - 100</td>
</tr>
</tbody>
</table>

Scale = 0-100. N: Diagnosed: n=65; Non-diagnosed: n=105; AQ Above: n=63; AQ Below n=107.
Personality

Formally diagnosed vs. undiagnosed

In comparing the personality characteristics of participants with an autistic spectrum diagnosis (n=65), against those without a diagnosis (n=105), we found expected differences in personality traits in line with previous research (Austin, 2013; Baron-Cohen & Wheelwright, 2004; Schriber, et al., 2014; Wakabayashi, Baron-Cohen, & Wheelwright, 2006; Warrier et al., 2018), see Figure 2. Diagnosed participants were significantly less likely to be open to trying new things, scoring 19% less than non-diagnosed respondents on “Openness to experience”. Additionally, diagnosed participants scored 20% lower on “Empathy” compared to non-diagnosed respondents, likely illustrating a difficulty in understanding others’ mental states. Finally, diagnosed respondents were more prone to experiencing anxiety and depression, scoring 26% higher on the trait “Neuroticism”.

Figure 2.
Mean scores for Openness, Empathy, and Neuroticism for the diagnosed and non-diagnosed groups
AQ thresholds: above vs. below

When comparing the personality characteristics of participants who scored highly on the AQ, above the screening threshold (n=63), against those of low scoring participants (n=107), we found the same differences in traits as for the diagnosed/undiagnosed groups. This finding is unsurprising given that more than half the diagnosed participants also scored highly on the AQ. There was one additional difference, however. People scoring above the AQ thresholds were likely to be 33% less extraverted than those scoring below the screening threshold. In line with previous research, these findings suggest a less change-embracing, more introverted and less socially confident profile for respondents diagnosed with autism and/or those scoring above the AQ screening threshold (ASPECT, 2013; Austin, 2005; Schriber et al., 2014).

Gender differences within the diagnosed sample

We also explored whether patterns of gender differences previously shown in personality (Chandler et al., 1978; Good&Co Validation, 2017; Pratto et al., 1994) held within the diagnosed sample. While we found fewer gender differences across individual traits in the diagnosed sample, compared to the non-diagnosed (neurotypical group), the broad pattern is reflective of previous research in neurotypical samples for Extraversion (Chandler et al.) and Authority (e.g. Pratto et al.) with males scoring higher than females on these underlying traits. The differences in means, however, between males and females in the diagnosed group were considerably larger than those in the non-diagnosed group. For example, in the case of Extraversion, the diagnosed group had a mean difference of 14.71 between males and females, while the mean difference in the non-diagnosed group was 8.63 (see Table 3).
Table 3.

Means and standard deviations (SD) for males and females within the diagnosed and non-diagnosed groups

<table>
<thead>
<tr>
<th></th>
<th>DIAGNOSED</th>
<th>NON-DIAGNOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MALE</td>
<td>FEMALE</td>
</tr>
<tr>
<td></td>
<td>MEAN (SD)</td>
<td>MEAN (SD)</td>
</tr>
<tr>
<td>OPENNESS</td>
<td>55.36 (21.88)</td>
<td>34.74 (22.79)</td>
</tr>
<tr>
<td>CONSCIENTIOUSNESS</td>
<td>50.41 (26.06)</td>
<td>51.58 (20.79)</td>
</tr>
<tr>
<td>EXTRAVERSION</td>
<td>44.78 (17.84)</td>
<td>30.07 (13.57)</td>
</tr>
<tr>
<td>AGREEABLENESS</td>
<td>52.82 (36.41)</td>
<td>56.40 (35.51)</td>
</tr>
<tr>
<td>STABILITY</td>
<td>56.29 (21.41)</td>
<td>55.50 (19.41)</td>
</tr>
<tr>
<td>EMPATHY</td>
<td>49.46 (28.41)</td>
<td>44.52 (17.47)</td>
</tr>
<tr>
<td>DRIVE</td>
<td>49.65 (27.17)</td>
<td>48.95 (26.35)</td>
</tr>
<tr>
<td>AUTHORITY</td>
<td>58.91 (22.20)</td>
<td>54.20 (20.76)</td>
</tr>
</tbody>
</table>

Stability is reversed. Diagnosed: n=34 males, n=30 females; Non-diagnosed: n=54 males, n=47 females.

While these findings are representative of a neurotypical sample, they are not in line with previous research which found that differences in personality between adults with autism and a neurotypical group, did not vary as a function of gender (Schriber et al., 2014). It may be that non-significant findings in Schriber and colleagues’ study were due to the unequal ratio of men to women (22% of females) in their sample. One of the strengths of our study is the equal number of diagnosed men and women in the sample. One finding contrary to neurotypical studies, showed that females in the diagnosed group were likely to score lower on traits related to openness to experience, showing that they were less likely to be spiritual and open minded, than their male counterparts, with a mean difference of 20.62. This is unusual as women generally have been found to exhibit higher levels of such traits underlying Openness than males (Costa Jr, Terracciano, & McCrae, 2001; Good&Co Validation, 2017; Weisberg, DeYoung, & Hirsh, 2011).
3. CONCLUDING REMARKS

In this report, we have discussed the usability of Good&Co’s quiz for adults with autism. The results of the validation study show that Good&Co’s model operates in a similar way with a neuro diverse sample of participants, finding similar outcomes to those observed in the academic literature.

These findings suggest that the Good&Co app could be used by adults with autism without bias and could be useful in giving further insights pertaining to their workplace personalities. Furthermore, the same patterns of personality differences between people diagnosed with ASD and those without a diagnosis are akin to those seen in existing literature. The model was found to have no adverse impact on neuro diverse users which means that the model is not biased in favor of neurotypical app users.

Our confidence in our model is based on converging evidence from several sources:

1. The longstanding scientific literature, which gave rise to the theoretical underpinnings of the approach;
2. Confirmatory factor analysis, confirming the validity of the factor structure of the model;
3. Multivariate analyses establishing that findings produced using Good&Co’s model show a comparable pattern of results (in gender differences, for example) to well-validated personality measures used in academic research;
4. Quantitative and qualitative analyses establishing that our model is useful to adults with autism.

In summary, our psychometric model fulfils the requirements for all relevant forms of validity testing, each of which will be briefly considered in turn:
Population validity (generalizability)

Especially in an applied context, it is essential for an assessment to produce valid results across as broad a spectrum of the population as possible. With a sample size of 2.7 million, across all life stages and many different professions, along with the ongoing localized validation studies carried out by our psychometrics team to ensure universality of our items, we feel that our assessment amply fulfils this requirement.

Ecological validity (real-life context)

Many psychometric assessments require completing long, pen-and-paper measures, which is not in keeping with general experience in the digital age. The nature of traditional psychometric tests is likely to influence responding, reducing the validity of the results. With its user-friendly app, and informal language, Good&Co’s model offers, by definition, a more organic, intuitive and ecologically valid approach to personality assessment.

Internal validity

Psychometric assessments are often completed in a vacuum, making it difficult to determine the reliability of measured responses. Was a particular profile due to the individual’s mood on that day? Would the same person score quite differently on a rainy day compared to a sunny one? A one-off profile in specific circumstances cannot inform us on this. Good&Co’s psychometric data is collected from multiple sources, at multiple time points, in multiple contexts, across several applied settings: culture analytics, group-level profiling, and peer ratings. We are able to profile the individual in the context of his or her organization, team, industry and specific job role.

While individual personality profiling can never be an exact science, with so many points of contact for each person, our approach tolerates missing or poor-quality data well. It also allows us to estimate our level of confidence in any given profile, and request further data as needed.
Criterion and construct validity

As demonstrated above, Good&Co’s test items perform as expected when compared against third-party benchmarks, both statistically and in terms of effectiveness in applied settings. In previous research we found that our model captures nuanced, real-world differences - between managers and non-managers within the same team, for example, or between the employees of different organizations within the same narrow region of industry.

Good&Co commits substantial resources to ongoing validation studies, especially when it comes to testing the practical, predictive abilities of our model in a workplace setting. For the psychometrics team, scientific integrity is our highest priority. We believe in an iterative process, in which we continuously refine and improve our model as more data become available. Feedback, questions and suggestions are always welcomed and encouraged.

This information would not only help the individual, but it would also be helpful for potential employers and so aid with fit to job, company and team. A qualitative study evaluating the experience of using the app and receiving the accompanying insights will be published in early 2019.

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5. REFERENCES


