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Investigating gender differences in the factor structure of the Gudjonsson Compliance Scale

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Purpose. The Gudjonsson Compliance Scale (GCS) remains, in terms of its psychometrics, an under-researched instrument, in which gender differences in particular have been insufficiently examined. The aim of this research was to therefore investigate the effect of gender on the factor structure of the GCS.

Method. The GCS was administered to 441 females and 250 males. The data were factor-analysed, with 1-, 2-, 3-, and 4-factor solutions tested and compared. Procrustean rotation was applied to the male factor loading matrix to investigate structural equivalence across gender.

Results. Although a 3-factor solution was the best fit to the male GCS data, a 4-factor solution was the most acceptable fit to the female data. Whilst each of the factors had a high degree of determinacy, the identity coefficients indicated that these factors differ non-trivially across gender.

Conclusion. The GCS may measure different aspects of compliance across males and females, which may explain the gender differences in compliance found within the literature to date. The work also allows insight into why males and females may end up complying with police requests, which might ultimately help to inform strategies, implemented by police, to manage vulnerable general population suspects and witnesses. There is a need now to further investigate the structure of compliance across ethnic groups and/or countries where the GCS is administered.

The 'Planning and Preparation, Engage and Explain, Account, Clarification and Challenge, Closure, and Evaluation' model (PEACE) is thought to be an optimal method for investigative interviewing, leading to fewer false confessions than the more inquisitorial and aggressive Reid model of interviewing commonly used in the USA (Gudjonsson & Pearse, 2011). As persons with psychological vulnerability are more inclined towards making false confessions, when under pressure, the issue of false confession remains especially pertinent whenever PEACE is not used (Kassin *et al.*, 2010; Young, Goodwin, Sedgwick, & Gudjonsson, 2013).

Compliance is a psychological vulnerability that in the forensic context can lead to unreliable information being provided by the suspect or detainee. Trait compliance is correlated with situational compliance in both personal and impersonal relationships (see Gudjonsson, Sigurdsson, Einarsson, & Einarsson, 2008) and is typically measured using the Gudjonsson Compliance Scale (GCS; Gudjonsson, 1989, 2013). In original factor

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analysis of the GCS, three factors emerged from the data reflecting difficulties in coping with pressure from authority and related avoidance behaviours (factor 1); eagerness to please and meet expectations (factor 2); and a smaller third factor simply encompassing the items on which the answer 'false' indicates the compliant response (necessitating the three items being reverse-scored). The GCS was originally developed and evaluated on a relatively small sample (164 subjects, 81 males, and 83 females), which prevented gender differences in the factor structure being systematically investigated (Gudjonsson, 1989, p. 536). This limitation is not specific to the GCS; earlier research developing psychometric instruments in the more narrowly applied area was often ~~been~~ limited by opportunity and technology, precluding the more rigorous scale development now required (Zumbo, Sireci, & Hambleton, 2003).

Researchers routinely use the GCS to measure compliance in both males and females with the applied forensic setting, for example, as an adjunct to the Gudjonsson Suggestibility Scale administered to persons thought to be vulnerable during a police interview. The *a priori* assumption is that the GCS is a gender-invariant scale, such that the internal structure of compliance is equal in males and females, and that the 20 items on the GCS correspond equally (and load equally as well) onto the underlying compliance dimensions (difficulty coping with pressure, approval-seeking behaviour, and the third factor comprising the reverse-scored items). However, there is no empirical evidence demonstrating this assumption. This means it is possible that the findings reported in the literature could well be a consequence of the varying structure of the GCS across males and females. If the internal structure of the GCS does not apply (or apply equally as well) across subgroups within the sample, research findings will be correspondingly unstable. The literature shows that factor structures emerging from combined samples (males and females together) may not necessarily replicate when males and females are considered separately (see Milfont & Fisher, 2010; Zegers & Ten Berge, 1985; Zumbo *et al.*, 2003). Equivalence in the internal factor structure of a measure should ideally be investigated and established in each separate group onto whom the instrument is applied.

Research evidence dating back to the meta-analysis by Cooper (1979) has purported to show that women are more easily persuaded and compliant than men. However, as Eagly and Carli (1981) noted in a subsequent meta-analysis, the effect of gender on compliance was actually small in magnitude, and they argued that the effect identified in Cooper (1979) could have been an artefact of the experiment rather than a reflection of an underlying truth. These meta-analyses illustrate the importance of ensuring gender invariance within psychometric instruments, such that any gender effects to emerge are true effects rather than an artefact of measurement. If the internal structure of an instrument varies across gender, this may lead to the finding, for example, that women are more compliant than men, when in fact the reason for this finding is that the scale may not measure compliance in the same way across different subgroups (Eagly & Carli, 1981; Fontaine, 2005; Milfont & Fisher, 2010; Van de Vijver & Leung, 1997). It is well documented that the internal structure of psychometric tests can vary across gender (and cross-culturally), such that (1) the interrelationships amongst the items on a scale may not be the same when considering male and female data separately, and (2) thus, different underlying dimensions (first-order factors) comprising the behaviour being measured emerge may (Milfont & Fisher, 2010).

The GCS remains a psychometrically under-researched instrument. As such, the aim of this study was to investigate the effect of gender on the factor structure of the GCS. No research has yet attempted to quantify and compare the factor structure separately in both males and females. Given the original factor analytic results in Gudjonsson (1989), as well

as previous literature noting the role of both difficulties coping with pressure and eagerness to please in compliance (see Gudjonsson, 2013), it is predicted that (1) three factors will also emerge when male and female respondents are considered separately and that (2) these underlying factors will represent: A difficulty with pressure, approval-seeking tendencies or an eagerness to please, and perhaps also an obedience component, as defined by the items within the scale which directly ask whether or not participants consider themselves obedient. The three-factor structure predicted is the same as that identified by Gudjonsson (1989).

Method

Participants

The sample consisted of 691 participants – 441 females and 250 males, all of whom were staff and students at a University within the United Kingdom. The mean age of the female sample was 27.21 years (*SD* = 7.77); for males, the mean age was 28.05 years (*SD* = 7.58).

Instruments and procedure

The Gudjonsson Compliance Scale (Gudjonsson, 1989, ~~1997~~)

The GCS is a 20-item, true/false, instrument measuring the extent to which individuals tend to comply with others' requests. Scores range from 0 to 20. The scale was originally developed (1) to identify those individuals who may be more likely to make false confessions under pressure during interview and (2) to identify individuals who are more likely to be coerced into crime by peers and others. Scale validity is well documented, with Cronbach's alpha (α) coefficient in past studies ranging from .71 to .75 (in the current study, α = .71 for males and .73 for females). The 20 GCS items were originally rotated using a default Varimax procedure and three factors were extracted: Factor 1 comprising 10 items, reflecting difficulties in coping with pressure; factor 2 comprising five items, reflecting eagerness to please and to do what is expected; and factor 3 comprising five items, with modest loadings, reflecting an obscure factor difficult to define in terms of a specific latent construct.

Analytical strategy

The three-factor solution described by Gudjonsson (1989; see table 1 and pp. 536–537) was fitted to the current data using confirmatory factor analysis in Mplus software, which is a latent variable modelling programme (Muthén & Muthén, 2006). Should a poor model fit be found, exploratory factor analysis (EFA) was planned to investigate how best the 20 GCS items fit the current data, with the emergent solutions compared using chi-square and model fit indices. Initially, the EFA was run on the combined sample and then separately to investigate gender effects. The Guttman–Kaiser eigenvalue greater-than-one rule in conjunction with Cattell's scree test was used as the factor extraction method. Only factors that occurred before the scree and above the breakpoint between the scree and cliff were retained (Hayton, Allen, & Scarpello, 2004). Mplus does not enable parallel analysis with ~~categorical~~ data, because the method is not reliable with such data (Muthén, 2006). Procrustean rotation (PR) was applied to the male factor matrices to investigate structural equivalence (see Fisher & Fontaine, 2013, pp. 21–23).

Procrustean rotation

Once the most acceptable factor solutions were identified for both male and female data, coefficients of congruence were calculated to investigate structural equivalence across males and females, by applying PR. Factor rotation is a statistical process and can be relatively arbitrary, which can make factor structures look more similar than they in fact are. PR seeks to improve the accuracy of this procedure by rotating a matrix (in this study, the male factor structure) to the position of maximum similarity with a target matrix (the female factor structure). This is achieved by minimizing the sum of squared differences. Congruence indices of similarity are then yielded; in this study, the identity coefficient (IC) was used to ascertain the degree of similarity of the factors across gender. Congruence coefficient values of .9 or above show that factors are the same; values below .85 suggest that the factors are non-trivially different (Ten Berge, 1986; Van de Vijver & Leung, 1997).

Model fit

Factor analytic model fit in this study was defined in terms of three fit indices: The standardized population root-mean-squared residual (SRMR) (Preacher & MacCallum, 2002), with SRMR = .00, .03, and .06, respectively corresponding to perfect, good, and fair model fit in the population. The Comparative Fit Index (CFI) and the root mean square error of approximation (RMSEA) were also inspected to investigate model fit to the data: CFI values of .95 or above and RMSEA values of .08 or lower are considered to indicate an acceptable model fit (Drake, Belsky, & Fearon, 2014; Hu & Bentler, 1998). Chi-squared difference tests ascertained whether the difference in model fit was statistically significant.

Results

Bartlett's test of sphericity reached statistical significance (Bartlett, 1954). The Kaiser–Meyer–Oklin value for females was .75 and for males was .80, exceeding the recommended value of .6 (Kaiser, 1970, 1974) and supporting the factorability of correlation matrices derived from the male and female data sets separately.

Fitting the three-factor structure proposed by Gudjonsson (1989) to the current data revealed a poor fit to the data: $\chi^2(167) = 1514.09, p < .001$; CFI < .90; RMSEA > .10 (see Table 1). For males and females separately, the models failed to converge, when applying the structure presented by Gudjonsson (1989).

Exploratory factor analysis

Given the poor fit of the three-factor solution proposed by Gudjonsson (1989), an EFA was conducted to explore the best fitting model to the current male and female GCS data (see Table 1).

When considering the female data, absolute model fit indices reveal a CFI = .937 for the three-factor solution (3FS). Hu and Bentler (1999) propose, however, that CFI ≥ .95 is required for a model to be considered acceptable and the four-factor solution (4FS) shows a CFI > .95, which shows that a 4FS might be a better fit to the female compliance data. A chi-square difference test revealed that the 4FS is a significantly better fit to the data than the 3FS: $\Delta\chi^2 = 54.52$ (17), $p < .0001$. Items 1, 13, and 17–19 load significantly, and at ≥.40, onto the fourth factor; although, of those five items, items 1 and 18 cross-load – item 1 cross-loads onto the first factor (β = .50; factor 1 and β = .47; factor 4), whereas item 18 cross-loads onto the second factor (β = −.48; factor 2 and β = −.41; factor 4). SRMR = .31, which suggests a good model fit in the population.

Table 1. Factor analytic model fit indices and comparisons

	Combined (N = 690)					Females (N = 441)					Males (N = 250)				
	χ^2	df	p	CFI	RMSEA	χ^2	df	p	CFI	RMSEA	χ^2	df	p	CFI	RMSEA
Gudjonsson (1989) ~~3FS~~															
3FS	1514.09	167	<.001	.56	.11	–	–	–	–	–	–	–	–	–	–
EFA															
1FS	1749.98	170	<.001	.48	.11	1093.13	170	<.001	.38	.11	775.20	170	<.001	.60	.12
2FS	361.57	151	<.001	.93	.04	297.51	151	<.001	.90	.05	215.34	151	.001	.96	.04
3FS	279.05	133	<.001	.95	.04	226.81	133	<.001	.94	.04	174.09	133	.009	.97	.04
4FS	210.98	116	<.001	.97	.04	167.12	116	<.001	.97	.03	128.09	116	.209	.99	.02
EFA comparison															
1FS vs. 2FS	661.33	19	<.001	–	–	403.79	19	<.001	–	–	278.80	19	<.001	–	–
2FS vs. 3FS	74.88	18	<.001	–	–	63.35	18	<.001	–	–	38.97	18	.003	–	–
3FS vs. 4FS	62.61	17	<.001	–	–	54.10	17	<.001	–	–	41.37	17	.001	–	–

Note. FS = factor solution; EFA = exploratory factor analysis; CFI = Comparative Fit Index; RMSEA = root mean square error of approximation.
[a]For males and females separately, the models failed to converge, when applying the structure presented in Gudjonsson (1989).

For males, the 4FS also seems to be the best fitting model, when considering the model fit indices (CFI = .98; RMSEA = .03; SRMR = .34), and a significantly better fit than the 3FS ($\Delta\chi^2$ = 42.80 (17), $p < .001$; CFI = .97; RMSEA = .04; SRMR = .41). However, the fourth factor comprised just items 3, 19, and 20 as defined by loading significantly and ≥.40 onto the factor; moreover, all of those items cross-loaded closely, rendering it difficult to reliably assign any of those items to factor 4 alone. The 3FS was also an excellent fit to the data (CFI = .97) and consists of nine items loading at ≥.40 onto the third factor, whereas four items (items 9; β = .60, 13; β = .52, 17; β = −.71, and 19; β = −.67) loading solely onto factor 3. These results suggest that a 3FS might best explain the male GCS data.

Procrustean rotation

To investigate structural equivalence, factors 1–3 emerging from the male GCS were rotated onto the first three factors emerging from the female GCS (see Table 2). Based on the identity coefficients (IC), factor 1 for males and females may be considered broadly similar (IC = .88, which is over the required criterion of .85), but that factors 2 and 3 are non-trivially different across males and females: IC = .69 (for factor 2) and .51 (factor 3).

Factor determinacy coefficient

Factor determinacy coefficients (the correlation between factor score estimates and the respective factor) were computed using Mplus software. As shown in Table 2, a high **11** degree of determinacy was found ($r > .70$) for each of the factors, indicating that GCS factor score estimates could serve as suitable substitutes for the factors themselves in scenarios where latent structural analyses are not possible.

Factor labels

Given the factor loadings, the following labels were assigned to each factor (example items are provided in parentheses, for illustration purposes; see Table 2 for the full 20 items).

Females

Factor 1 reflects a fear of conflict/pressure/stress (Q1: Give in easily when pressured; Q2: Find it difficult to tell people that I disagree with them; Q4: Tend to give into people who insist they are right).

Factor 2 may tap into an eagerness to please/approval-seeking tendency (Q10: I try to please others; Q16: Try hard to do what is expected).

Factor 3 may measure coping with authority (Q3: People in authority make me feel uncomfortable and uneasy; Q5: Become easily alarmed/frightened with people in authority; Q6: I try hard not to offend those in authority).

Factor 4 may reflect an aspect of social conformity/acceptance (Q13: When uncertain, I accept; Q17: Not concerned what others think; Q19: Go along with others to please them).

Males

Factor 1 in males may reflect a desire to meet expectations and seek approval (Q8: Tend to go along with others, even if know they are wrong; Q10: Try to please others; Q16: Try to do what is expected).

Table 2. Exploratory factor analysis loadings and measures of structural equivalence across gender

GCS items	$F1_{fem}$	$F1_{male}$	$F2_{fem}$	$F2_{male}$	$F3_{fem}$	$F3_{male}$	$F4_{fem}$
1. Give in when pressured	**.50***	.00	.01	.26*	.09	**.44***	**.47***
2. Difficult to tell people I disagree	**.69***	**.30***	**.33***	.29*	.08	**.64***	.02
3. Authority makes me uneasy	.20	.07	.03	**.61***	**.58***	.01	.010
4. Give in to those insisting they're right	**.45***	.16	.17	.20	.05	**.42***	.26*
5. Alarmed by authority	.03	**.50***	**.44***	**.66***	**.72***	−.20	.01
6. Try not to offend authority	.04	**.54***	**.51***	**.37***	**.41***	.07	.04
7. I am obedient	**.58***	**.48***	**.50***	.20	.02	**.56***	.09
8. Go along with what told even when know it's wrong	**.40***	**.68***	**.69***	.20	.11	**.38***	.19
9. I avoid demanding situations	**.43***	.15	.15	**.30***	.18	**.35***	.08
10. I try to please others	.00	**.73***	**.73***	.02	.07	.02	.21*
11. Disagreeing w. others not worth it	**.45***	.16	.18*	.21	.07	**.41***	.02
12. Believe in doing what I'm told	.27*	.38*	**.39***	.09	.02	.27*	.05
13. When uncertain, accept what told	.08	.13	.13	.03	.01	.08	**.53***
14. Mostly avoid confrontation	**.42***	**.49***	**.51***	.12	.01	**.42***	.02
15. As a child, did what told	.06	**.43***	**.41***	**.30***	**.33***	−.03	.01
16. Try hard to meet expectations	.02	**.91***	**.91***	.03	.02	.07	.15
17. Not concerned what others think	−.26*	−.05	−.04	−.31	−.24*	−.16	**−.59***
18. I resist pressure to do things	−.06	**−.47***	**−.48***	−.01	−.03	−.08	**−.42***
19. Never go along with others to please	−.04	−.04	−.04	−.10	−.10	−.01	**−.52***
20. As a child, took the blame for things I hadn't done	.06	.22*	.21*	.13	.13	.02	.12
FDC	.83	.92	.89	.87	.78	.84	.77
IC	.88			.69		.51	

Note. FDC = factor determinacy coefficient; GCS = Gudjonsson Compliance Scale; IC = identity coefficient (factor congruence index); $F1_{fem}$, $F2_{fem}$, $F3_{fem}$, and $F4_{fem}$ = female factor 1, 2, 3, and 4 loadings, respectively; $F1_{male}$, $F2_{male}$, and $F3_{male}$ represent the procrustean-rotated male factor 1, 2, and 3 loadings. Factor loadings in bold are ≥.30.
*$p < .05$.

Factor 2: Goal/reward-orientated obedience (Q3: Discomfort in the face of authority; Q5: Become easily alarmed/frightened with people in authority; Q6: I try hard not to offend those in authority; Q9: Believe in avoiding rather than facing demanding situations; Q15: As a child, did what told).

Factor 3 may reflect difficulty coping with pressure (Q2: Find it difficult to tell people that I disagree with them; Q4: Tend to give into people who insist they are right; Q7: I am an obedient person; Q11: Disagreeing takes more time than it is worth; Q14: Mostly avoid confrontation).

Discussion

The aim of this study was to investigate whether the internal structure of the GCS is subject to gender differences. It was predicted that (1) a three-factor structure, originally found in Gudjonsson (1989), will also emerge when male and female respondents are considered separately and that (2) these underlying factors will represent: A difficulty with

pressure, approval-seeking tendencies or an eagerness to please and perhaps also an obedience component, given some items within the scale directly ask whether or not participants consider themselves obedient.

Results show that the original three-factor GCS structure presented in Gudjonsson (1989) is not a good fit to the current data, either when males and females are considered together or separately. The subsequent EFA reveals that, for males, a three-factor solution is the best fit, suggesting that compliance in males comprises three dimensions (as Gudjonsson (1989) put forward), but they differ in terms of the size of the factors and the items within them. For females, a four-factor structure actually seems the best fit, with each factor containing at least five items. A degree of cross-loading is evident (especially within the internal structure of compliance in females), but such cross-loadings are likely to occur, because some aspects of compliance are related. For example, item 2 'I find it hard to tell people I disagree with them' might reflect both difficulty coping with pressure in females – factor 1 – and eagerness to please and a desire for approval (which is why they seek to avoid disagreements) – factor 2. A high degree of factor determinacy was also found for each of the factors across gender, indicating that GCS factor score estimates could serve as suitable substitutes for the factors, and so bolstering the reliability of each of the factors to have emerged.

The factor IC provides evidence that compliance may be expressed differently in males and females: For biological and sociological reasons – for example gender roles – differences in how compliance might manifest across gender might be expected, in that women tend to score higher in anxiety, and to be more relationship oriented than males (Caldini & Goldstein, 2004; Costa, Terracciano, & McCrae, 2001). Whatley, Webster, Smith, and Rhodes (1999) further found that women tended to comply to alleviate feelings of shame and fear. ~~Results from the~~ Hofstede (1998) ~~study~~ (see Costa *et al.*, 2001)~~, on the other hand, showed~~ that males tend~~ed~~ to report dealing with facts (rather than feelings) and ~~to be~~ more focussed on occupational advancement compared with females, who appeared more concerned with job security and cooperation with co-workers. It could therefore be that female compliance may be more about reducing (social) anxiety in the presence of authority figures, as well as social acceptance from peers/friendship groups. Male compliance could be born out of goal orientation and the desire for reward (i.e., obedience within the workplace, for example, or difficulties coping with pressure and/or meeting expectations, due to a desire for reward – for example promotion at work – rather than through a fear of authority or anxiety).

This study provides potentially valuable information about the nature of compliance as measured by the GCS across gender and is, to our knowledge, the first study to attempt this. To date, the *a priori* assumption has been that the GCS is a gender-invariant instrument, but our results suggest that this may not be the case. Differences in compliance scores across gender seen in the literature may reflect the fact that the GCS measures differing aspects of compliance in males and females, and may not reflect true gender differences on the same compliance dimension(s) or measurement (South, Krueger, & Iacono, 2010). When it comes to using the GCS for research purposes, the implication is that comparing males with females may prove unreliable, because the GCS is tapping into different aspects of compliance across gender.

A limitation of the research is that the sample comprised participants from the general population, so caution must be exercised when transferring these findings onto forensic populations, given that a proportion of detainees have concurrent mental health and learning disabilities (Milfont & Fisher, 2010; Young *et al.*, 2013). Young *et al.* (2013) reported the Royal Commission's finding that 35% of detainees could have been considered

vulnerable due to problems that may interfere with their functioning and ability to cope during police questioning. In the case of such vulnerable detainees, intellectual disability and mental functioning may be the prevailing reason driving compliance. The figure reported by the Royal Commission though does not take into account detainees within the general population who are without intellectual disability or clinical disorder but could nonetheless still find it difficult to cope with the pressure of questioning due to inherent psychological characteristics, such as high levels of trait anxiety and stress sensitivity (Belsky & Pluess, 2009; Drake, 2014; Drake, Gudjonsson, Sigfusdottir & Sigurdsson, 2014). Witnesses also reside within the general population (Hervé, Cooper & Yuille, 2013). Data from a general population sample are therefore still useful for informing forensic thinking and might ultimately help to inform strategies implementable by police to manage vulnerable interviewees and obtain more accurate information.

Given the novelty of the four-factor solution that has been identified to best explain the female GCS data, future research is needed to replicate this finding. Our study also suggests a need for more detailed research into the structure of compliance in males and females, coupled with external validation of the construct against actual behaviour. The field could benefit from investigating the internal structure of the GCS across different age ranges, as well as ethnic groups, and across countries where the instrument is used. Furthermore, there may be some value in viewing compliance as a broad construct consisting of three (or four, in the case of females) related yet distinct underlying dimensions.

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