Brief Report

Classroom ratings of likeability and popularity are related to the Big Five and the general factor of personality

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ABSTRACT

The present study examined whether: (i) self-rated personality (Big Five) is related to peer-ratings of likeability and popularity in classmates and (ii) a General Factor of Personality (GFP), reflecting the shared variance of the Big Five, is related to social status. In a sociometric approach, adolescent classmates (N = 512) rated each other on likeability and popularity. The Big Five dimensions Extraversion and Emotional Stability were associated with likeability as well as popularity whereas Agreeableness was positively related to likeability and Conscientiousness negatively to popularity. Moreover, the results of correlation and regression analyses and Structural Equation Modeling converged in showing that the GFP was also a predictor of likeability and popularity, although the GFP played a somewhat larger role in likeability than in popularity.

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1. Introduction

For many adolescents it is important to obtain high levels of peer acceptance. Being popular or liked by many holds advantages such as better access to potential mates and more support from others (e.g., Cillessen & Rose, 2005). This affects well-being (Newcomb, Bukowski, & Pattee, 1993). Adolescents' success in achieving peer acceptance and high-quality friendships also predict success later in life. For example, a low social status in adolescence predicts risk for psychological disorders in adult life. In contrast, obtaining high social status or establishing positive contacts with class mates predicts healthy individual and social functioning during adult life (Ostberg, 2003). Previous research on social status suggests that it is relevant to distinguish between two categories; likeability and popularity (e.g., Cillessen & Rose, 2005). Likeability refers to the extent to which one is considered as friendly and cooperative, and is associated with high levels of prosocial behavior and low levels of aggression. Likeable individuals are often emotionally well-adjusted and have high-quality friendships (Cillessen & Rose, 2005). Popularity refers to the extent to which one has prestige and influence in a group, and is often associated with social dominance. Compared to likeability, popularity is a more diffuse concept that can be based on positive characteristics (intelligence, friendliness,

attractiveness) but also more negative characteristics such as aggression, arrogance, and manipulativeness (Cillessen & Rose, 2005).

The present study serves two aims. The first aim is to contribute to general insight into the relationship between personality and social status. Currently there are very few studies in this area (e.g., Anderson, John, Keltner, & Kring, 2001; Scholte, van Aken, & van Lieshout, 1997). We know of only one study that explicitly differentiated between popularity and likeability in relationship to personality (Mervielde & de Fruyt, 2000). Yet, the study of Mervielde and de Fruyt (2000) determined popularity and likeability by means of peer-ratings of personality characteristics instead of using explicit measures of the social status factors. In the present study we take a different approach by examining the relationship between self-reported Big Five personality measures (Openness to experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism) and explicit peer-rated measures of popularity and likeability.

The second aim of this study was to contribute to current discussions on higher-order factors of personality by examining the relationship between social status and a presumed higher-order construct of personality reflecting the shared variance of lower-order personality traits (e.g., the Big Five). In the current literature this construct is often labeled as the General Factor of Personality (GFP; Musek, 2007; Rushton, Bons, & Hur, 2008; van der Linden, te Nijenhuis, & Bakker, 2010). Previous studies have already indicated that higher-order compounds of personality traits are related to social status. For example, Mervielde and de Fruyt (2000) found peer-likeability ratings to be mainly characterized by Agreeableness,

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whereas popularity (e.g., outgoing, bossy, noisy) was mainly characterized by a mix of high Extraversion and high Emotional Stability. These latter results indicate that in some cases, social status can best be predicted by a mix of lower-level traits. Yet, no other study went so far as to directly test the relationship between the GFP and social status.

For decades, a general factor in personality was mentioned only sporadically in the literature but never received much attention, probably because its psychological meaning was unclear. More recently however, the GFP has received increasing attention, which has led to a lively debate about its nature. Several researchers have suggested that the GFP is mainly an empty construct that either reflects response tendencies such as social desirability (e.g., Anusic, Schimmack, Pinkus, & Lockwood, 2009; Bäckström, Björklund, & Larsson, 2009) or otherwise may be a statistical artifact, based on multi-trait correlated personality facets (Ashton, Lee, Goldberg, & de Vries, 2009). Other researchers however, have argued that the GFP may be a substantive factor that is, just as other personality factors, related to a range of different life domains (Musek, 2007; Rushton et al., 2008; van der Linden et al., 2010). There is some evidence for both the artifact and the substantive interpretation of the GFP. Consequently, there is no consensus and to date the concept of the GFP remains controversial.

In light of the above, testing the role of the GFP in obtaining social status does not only provide insight into the relationship between personality and peer acceptance but also contributes to current discussions about the nature of the GFP. More specifically, if a GFP, based on self-reported Big Five measures, is related to peer nominations of likeability and popularity, it is unlikely to be a mere artifact. Instead, such an association would suggest that the GFP has a substantive component with real-life implications.

2. Method

2.1. Participants and procedure

Participants were 512 students (56% female, 44% male) in 22 third-year classrooms of 22 junior high schools in the Netherlands (parental consent was obtained). Mean age was 14 years and 10 months (SD = 7 months). The average number of students per class was 23 (response rate was 88% of the classrooms students). The majority (90%) of the students was of Dutch descent. Data were collected during one regular classroom session of 50 min in which participants completed self-report personality questionnaires and the sociometric measures.

2.2. Measures

2.2.1. Personality
Personality was measured with the Quick Big Five (QBF; Vermulst & Gerris, 2005) consisting of 30 adjectives reflecting the Big Five traits of O, C, E, A, and ES. On a 7-point scale, participants were asked to rate the extent to which a particular adjective applied to them ranging from '1' completely untrue, to '7' completely true. The scale is a valid and reliable measure of the Big Five dimensions. Sample reliabilities (Cronbach's alpha) were $O = .66$, $C = .80$, $E = .83$, $A = .72$, $ES = .73$.

2.2.2. Social status
Likeability and popularity were measured using a sociometric approach: Each participant could nominate an unlimited number of class mates on each of eight questions. Specifically, they had to provide names for classmates they considered (1) most liked, (2) a leader, (3) most popular, (4) most relationally aggressive, (5) a best friend, (6) cooperative, (7) humorous, and (8) physically

aggressive, respectively. Nominations for each student were counted and transformed to z scores to control for class size differences. Factor analyses confirmed the existence of two categories namely likeability and popularity (Eigenvalues of 3.36 and 2.22, respectively). Likeability refers to the extent to which one is perceived as a likeable person, with which one wants to be friends, or wants to co-operate (questions: 1, 5, 6, 7). Popularity reflects the extent to which one is considered popular and to have a high social impact (questions: 2, 3, 4, 8).

2.3. Statistical analyses

In testing the role of personality we used methods such as exploratory factor analyses, correlations, and regressions, but also Confirmatory Factor Analysis (CFA) using Structural Equation Modeling (SEM). The former methods have the advantage of being straightforward and to allow comparisons with numerous previous articles that have used similar methods in extracting a general factor in the cognitive domain. The CFA/SEM method is used because it offers the possibility to test (and confirm) a priori, theoretical models.

To obtain a GFP for the correlation and regression analyses, we extracted the first unrotated factor from the Big Five measures. This approach is similar to extracting the general factor in the domain of cognitive ability, and has also been used in other GFP studies (e.g., Musek, 2007; Veselka, Schermer, Petrides, & Vernon, 2009). We explicitly report results of the Principal Axis Factoring (PAF) method, reflecting the shared variance of the Big Five. Yet, for reasons of comparison we also tested Principal Component Analysis (PCA) and Maximum Likelihood method (ML) extraction methods and CFA/SEM.

3. Results

3.1. Factor analysis/GFP Extraction

The first unrotated factor (GFP) explained 35% of the Big Five variance, with sample loadings of $O = .30$, $C = .05$, $E = .79$, $A = .42$, and, $ES = .45$ (PAF method). In line with Musek (2007), we found the GFP extracted with the PAF method to correlate highly with the GFPs extracted with other methods ($r = .90$ and $r = .91$ for PCA and ML, respectively). In the current sample, Conscientiousness did not load strongly on the GFP, whereas the loading of Extraversion was relatively high. Therefore, in this study we also composed a GFP based on meta-analytic sample loadings as reported in a large GFP meta-analysis ($k = 212$, $N = 144.117$; van der Linden et al., 2010) with loadings of $O = .42$, $C = .63$, $E = .57$, $A = .57$, $ES = .62$. These loadings can be expected to provide a more stable picture of the GFP compared to a general factor derived from single-sample loadings. Moreover, the GFP based on meta-analytic loadings can be considered a truly well-balanced mix of traits in which each of the Big Five dimension contributes substantially to an individual's GFP score. We found that the sample-based GFP was quite strongly related to the meta-analytic based GFP ($r = .86$). Overall, the findings for the different extraction methods imply that type of method and sample fluctuations in factor loadings only marginally influence GFP characteristics.

3.2. Peer-ratings and personality factors: Correlations and Regressions

3.2.1. Likeability
Table 1 shows that Extraversion had the highest correlation with likeability, closely followed by the sample-based GFP, and then the meta-analytic based GFP. Agreeableness still correlated

Table 1
Means, standard deviations, and correlations between the study's variables.

	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Likeability[a]	0	.75	–								
2. Popularity[a]	0	.71	.30[**]	–							
3. Sample GFP[b]	1.96	.28	.33[**]	.27[**]	–						
4. Meta-analytic GFP	2.68	.32	.25[**]	.13[*]	.88[**]	–					
5. Openness	4.72	.94	.06	.04	.40[**]	.44[**]	–				
6. Conscientiousness	4.95	1.19	.01	−.15[*]	.06	.50[**]	.06	–			
7. Extraversion	4.91	1.13	.37[**]	.37[**]	.89[**]	.67[**]	.17[**]	−.07	–		
8. Agreeableness	5.47	.71	.17[**]	.00	.52[**]	.61[**]	.34[**]	.24[**]	.31[**]	–	
9. Emotional Stability	4.44	1.04	.13[*]	.10[*]	.66[**]	.60[**]	.04	−.03	.46[**]	.09	–

[a] Means are based on standardized scores (SD ≠ 1, because of participants with missing items on some measures).
[b] Based on the Principal Axis Factoring (PAF) method.
[*] $p < .05$.
[**] $p < .001$.

$r = .17$ with likeability, whereas the correlations with the remaining dimensions were relatively low.

A regression analysis in which we entered each of the individual Big Five dimensions explained a total of 14.1% of the likeability variance. The individual beta-weights are given in Table 2. In recent literature the GFP is sometimes considered to be a substantive factor that partly underlies lower-order personality traits in a similar way that the cognitive general factor g determines variance in specific cognitive ability tests. In this sense, it is useful to examine how the total unique variance of the Big Five contributes to variance in social status beyond that proportion of likeability variance that is already explained by the GFP. To test this, we conducted a hierarchical regression analysis in which we entered the GFP in the first step and the Big Five in the second step. This analysis showed that the GFP in Step 1 explained 10% of the variance in likeability ($p < .001$). Beyond that, the Big Five explained another 4% ($p < .001$) in Step 2. Note that in such a two-step regression analysis the main focus is on the percentages of explained variance in each step; the individual beta-weights of the Big Five in the second step are not readily interpretable or informative as the GFP in the first step consists of a linear (weighted) combination of the Big Five in the second step.

3.2.2. Popularity

For popularity, Extraversion again showed the highest positive correlation, followed by the sample-based GFP, the meta-analytic based GFP and finally Emotional Stability. Agreeableness was not related to popularity, and Conscientiousness was even significantly negatively related to popularity (see Table 1).

Similar analyses as with likeability (see above) showed that a regression with all Big Five dimensions explained 15.9% of the popularity variance. The beta-weights of the Big Five on popularity are listed in Table 2. A hierarchical regression analysis showed that the GFP entered in Step 1 explained 7.2% of the variance in popularity. Including the Big Five in Step 2 added another 9.4% ($p < .001$) of explained variance in popularity. Again, individual beta-weights are not very informative in this analysis (see above).

Table 2
Individual beta-weights and explained variance of regression analyses of Big Five on likeability and popularity.

	Likeability	Popularity
Openness	−.04	.01
Conscientiousness	.02	−.10[*]
Extraversion	.39[**]	.45[**]
Agreeableness	.06	−.09
Emotional Stability	−.07	−.10[*]
ΔR^2	.141[**]	.159[**]

[*] $p < .05$.
[**] $p < .01$.

3.3. Peer-ratings and personality factors: confirmatory factor analysis using Structural Equation Modeling

With the SEM approach we compared different theoretical models (using ML Estimation). We first tested a model in which the Big Five traits served as indicators for a single latent factor (GFP), which had paths to likeability and popularity. The initial GFP model did not lead to an acceptable solution. Subsequent analyses of the data structure however, revealed that in the current sample there were associations between the Big Five factors that were not accounted for by the shared component. The first association was between Extraversion and Emotional Stability. In addition, there were associations between Agreeableness and Openness, and Agreeableness and Conscientiousness. It is likely that these associations arise from method effects as in the QBF, Extraversion and Emotional Stability are the only two traits that are measured with almost exclusively negative items (e.g., shy, nervous), whereas the other three traits are measured with positive items only. Controlling for such method effects by allowing the above described Big Five associations (adding three freely estimated pathways) considerably improved the model and led to an acceptable fit ($\chi^2 = 29.24$, df = 11, NNFI = .92, CFI = .98, RSMEA = .06). Note that adding associations affected the model fit but did not affect the relationships between the variables. In this model the GFP had significant paths to likeability and popularity of .48 and .46, respectively (see Fig. 1).

We also tested alternative models. In the first model, Extraversion and Emotional Stability had direct relationships with likeability and popularity, and Agreeableness was allowed to directly relate to likeability. For consistency and comparison reasons, in this model we also allowed for the same method-effects associations as in the GFP model described above (Extraversion-Emotional Stability, Agreeableness-Openness, and Agreeableness-Conscientiousness). This model had a poor fit ($\chi^2 = 88.73$, df = 13, NNFI = .70, CFI = .95, RSMEA = .11). Model fit did not improve when we further allowed the other Big Five traits to directly relate to likeability and popularity.

4. Discussion

The present findings may be relevant for research on personality and social status, as well as for specific research on the GFP. Regarding the former, simple correlations suggested that highly likeable classmates are adolescents who described themselves as extraverted, emotionally stable, and agreeable. Correlational analyses also indicated that popular classmates were mainly extraverted and emotionally stable, and not so conscientious. The relatively strong role of Extraversion in both likeability and popularity is in accordance with previous findings of Anderson et al.
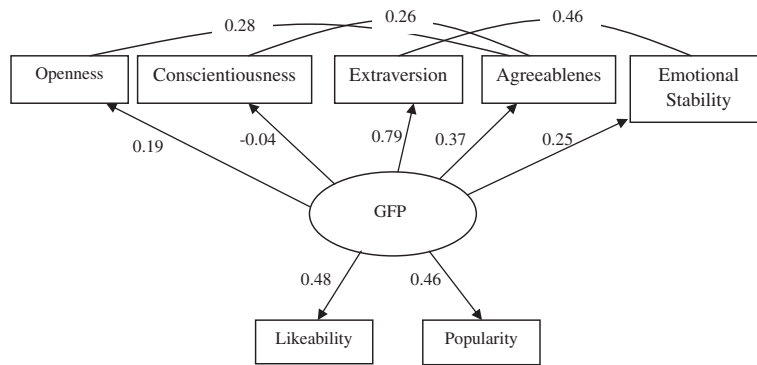
Fig. 1. Structural Equation Model in which the Big Five are indicators of a GFP, which affects both likeability and popularity.

(2001) who reported effect sizes of Extraversion-Social status associations ranging from .36 to .48. The role of Emotional Stability in social status is also in line with Anderson et al. (2001) and with Mervielde and de Fruyt (2000). Considering the definition of likeability it makes sense that Agreeableness was significantly correlated to likeability but not to popularity. Overall, these findings underline the importance of distinguishing between likeability and popularity in future social status research as both constructs were linked to a different profile of traits.

Remarkably, the relationships of several individual Big Five dimensions with social status changed when all five were tested simultaneously in regression analyses. For example, in a regression with likeability as dependent variable, the beta-weights of Emotional Stability and Agreeableness were no longer significant, which was in contrast to the correlational findings. The fact that the role of the individual personality dimensions changed when tested simultaneously suggests that these dimensions have overlapping variance and therefore might indicate the presence of higher-order factors.

One of the presumed higher-order factors in personality that we tested in this study was the GFP. The different methods we adopted, ranging from simple correlations and regressions to SEM, and using sample-based and meta-analytic based GFPs all pointed into the same direction and indicated that the GFP is related to both likeability and popularity. Moreover, in hierarchical regressions the GFP accounted for the largest amount of variance in likeability. Beyond the GFP, the Big Five explained a relatively small additional amount of variance. For popularity, the picture was somewhat different as the contribution of the Big Five, beyond the GFP was relatively large (7.2% for the GFP and another 9.4% for the Big Five). These findings indicate that the GFP plays a larger role in likeability than in popularity. This was also supported by the fact that the meta-analytic based GFP was relatively strongly correlated with likeability ($r = .25$) and not so strongly with popularity ($r = .13$).

Present results may have implications for the discussion about the GFP. Specifically, it has been argued that a GFP merely reflects methodological artifacts such as social desirability or statistical artifacts (Ashton et al., 2009; Bäckström et al., 2009) However, the fact that in the present study, the GFP was related to peer-ratings of social status makes it less likely that this construct is a mere artifact. In contrast, this study indicates that a persons' GFP score reflects at least a substantive component influencing how adolescents rate individuals in terms of social status.

In interpreting the present results it is useful to take potential limitations into account. For example, in the current study the GFP loading of Conscientiousness was quite low and the one of Extraversion relatively high, which may partly compromises the interpretation of the sample-based GFP as a truly *general* factor. On the other hand, we also obtained a GFP based on meta-analytic

loadings, which undeniably can be considered a well-balanced mix of each of the Big Five traits. The results of the sample-based GFP were not substantially different from the results obtained with the meta-analytic GFP as both were associated with likeability and popularity.

Subsequent research in this area might want to further elaborate on how to interpret a GFP and through what mechanisms it may affect peer-ratings. Previous GFP literature provides several indications. For example, the GFP has been found to overlap with social or emotional intelligence, and with self-esteem (Veselka et al., 2009). In addition, several authors have suggested that the GFP reflects a mix of socially desirable traits that have emerged from evolutionary selective forces that favor co-operation and social cohesion (Rushton et al., 2008). Which of these or other accounts of the GFP is true remains an open question for future empirical research. Regardless, the current study suggests that personality traits at the Big Five level, as well as higher-order compounds (GFP) can be used to predict social status in adolescents.

References

Anderson, C., John, O. P., Keltner, D., & Kring, A. M. (2001). Who attains social status? Effects of personality and attractiveness in social groups. *Journal of Personality and Social Psychology, 81*, 116–132.

Anusic, I., Schimmack, U., Pinkus, R. T., & Lockwood, P. (2009). The nature and structure of correlations among Big Five ratings: The Halo-Alpha-Beta model. *Journal of Personality and Social Psychology, 97*, 1142–1156.

Ashton, M. C., Lee, K., Goldberg, L. R., & de Vries, R. E. (2009). Higher order factors of personality: Do they exist? *Personality and Social Psychology Review, 13*, 79–91.

Bäckström, M., Björklund, F., & Larsson, M. R. (2009). Five-factor inventories have a major general factor related to social desirability which can be reduced by framing items neutrally. *Journal of Research in Personality, 43*, 335–344.

Cillessen, A. H. N., & Rose, A. J. (2005). Understanding popularity in the peer system. *Current Directions in Psychological Science, 14*, 102–105.

Mervielde, I., & de Fruyt, F. (2000). The Big Five personality factors as a model of the stucture of children's peer nominations. *European Journal of Personality, 14*, 91–106.

Musek, J. (2007). A general factor of personality: Evidence for the Big One in the five-factor model. *Journal of Research in Personality, 41*, 1213–1233.

Newcomb, A. F., Bukowski, W. M., & Pattee, L. (1993). Children's peer relations: A meta-analytic review of popular, rejected, neglected, controversial, and average sociometric status. *Psychological Bulletin, 113*, 99–128.

Ostberg, V. (2003). Children in classrooms: Peer status, status distribution, and mental well-being. *Social Science and Medicine, 56*, 17–29.

Rushton, J. P., Bons, T. A., & Hur, Y.-M. (2008). The genetics and evolution of a general factor of personality. *Journal of Research in Personality, 42*, 1173–1185.

Scholte, R. H. J., van Aken, M. A. G., & van Lieshout, C. F. M. (1997). Adolescent personality factors in self-ratings and peer nominations and their prediction of peer acceptance and peer rejection. *Journal of Personality Assessment, 69*, 534–554.

van der Linden, D., te Nijenhuis, J., & Bakker, A. B. (2010). The general factor of personality: A meta-analysis and a criterion-related validity study. *Journal of Research in Personality, 44*, 315–327.

Vermulst, A. A., & Gerris, J. R. M. (2005). *Quick Big Five personality test manual*. Leeuwarden, The Netherlands: LCD.

Veselka, L., Schermer, J. A., Petrides, K. V., & Vernon, P. A. (2009). Evidence for a heritable general factor of personality in two studies. *Twin Research and Human Genetics, 12*, 254–260.