



A measurement invariance investigation of the differences in shyness between adolescents and adults



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ABSTRACT

This study addresses the question of whether adolescents or adults are more shy. On the one hand, adolescents spend most of their days functioning as part of a social group (school class), which fosters socialisation processes. However, on the other, in the face of new experiences, shyness may intensify as a result of the development of maladaptive reactions or excessive adjustment to social conventions.

Two studies were conducted on different age samples: 314 adults aged 18–35 and 247 high school students, aged 16. In order to verify the hypotheses, the Revised Cheek and Buss Shyness Scale (RCBS) was administered.

As a result of confirmatory factor analyses, it has been demonstrated that: (1) the structure of shyness among adults and adolescents, as measured by the RCBS scale, could be either interpreted as unifactorial or three-factorial; and (2) there is partial scalar measurement invariance for both the unifactorial and the three-factor models. The comparison of the average latent mean scores suggests that adults are more shy than adolescents, regardless whether the total score or specific factors were compared.

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1. Introduction

In general, shyness is defined as discomfort or inhibition (Jones, Briggs, & Smith, 1986). Although shyness can be interpreted in various ways, in the current paper we recognise it as a personality trait and a component of introversion (Hofstee, De Raad, & Goldberg, 1992). One of the most popular research tools for measuring shyness under such a conceptualisation is the Revised Cheek and Buss Shyness scale (RCBS) (Cheek, 1983; Cheek & Buss, 1981). There are a variety of different perspectives on the structure of the RCBS, namely – the unifactorial, two- and the three-factor models (Cheek, 1983; Cheek & Buss, 1981; Crozier, 2005; Hopko, Stowell, Jones, Armento, & Cheek, 2005; Vahedi, 2011). The two-factor model (Crozier, 2005; Vahedi, 2011) comprises factors distinguished only on the basis of item wording (i.e., separate factors for positively and for negatively worded items), whereas the three-factor model (Hopko et al., 2005) distinguishes between facets of shyness – general social distress, stranger shyness and assertiveness difficulty. Among these, a study by Kwiatkowska, Kwiatkowska, and Rogoza (in press) demonstrated that the two-factor model does not yield any psychological meaning: although, in their study, the initial two-factor model was well-fitted to the data and the strength of the factor loadings was high, the introduction of a bifactor into the scale's structure resulted in a radical decrease of the strength of the loadings in specific factors. Thus – only the

unifactorial (Cheek, 1983; Cheek & Buss, 1981) and the three-factor (Hopko et al., 2005) models are promising for the interpretation of the RCBS structure. Until now the structure of RCBS scale has not been verified in an adolescent sample; in particular, so far, no analyses have been carried out in order to resolve the measurement invariance (MI) of the RCBS scale, which is a fundamental prerequisite for conducting comparative analyses between different samples (Van de Schoot, Lugtig, & Hox, 2012).

1.1. Age differences in shyness among adults and adolescents

Longitudinal studies provide evidence that shyness in childhood is an important predictor of interpersonal and intrapersonal adjustment difficulties (Grose & Coplan, 2015). Some shy young adults report being shy in early childhood and remaining so until adulthood—therefore, it is considered that, in cases of early-developing shyness, physiological and genetic factors are important in personality development (Cheek & Tyson, 2009). Shy adults reported the first signs of shyness between the age of 8–14, so it is believed that late-developing shyness is a result of problems in social development—particularly at cusp between childhood and adolescence, with the age of 14 considered as a developmental peak for shyness (Cheek & Tyson, 2009).

In the current literature, there is a disagreement regarding age differences in shyness. There are no strict cross-sectional studies investigating differences between the intensity of shyness in adolescent and adult samples and also, neither of the studies on shyness investigated the MI across compared samples, whereas longitudinal studies suggest

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that shyness increases with age (Karevold, Ystrom, Coplan, Sanson, & Mathiesen, 2012; Van Zalk, Lamb, & Rentfrow, 2016). Current paper aims to assess age differences in shyness through cross-sectional comparison of samples and by investigating the MI prior to group comparisons.

2. Current study

The goals of the current paper are threefold—we aim to: (1) verify the measurement model of shyness, as measured by the RCBS scale in adults and adolescents; (2) verify whether measurement of shyness is invariant among adults and adolescents; and (3) test the age differences in shyness. Referring to the foregoing research purposes, we hypothesise that:

1. There are two equivalent measurement models of shyness, as measured by the RCBS scale, i.e., the unifactorial and the three-factor, both in adults and adolescents. Our hypothesis is based on previous studies, which demonstrate that the structure of shyness, as measured by the RCBS scale, could be interpreted either as unidimensional or as multidimensional (Cheek, 1983; Cheek & Buss, 1981; Hopko et al., 2005; Kwiatkowska et al., *in press*).

2. Measurement of shyness (both as the unifactorial and as the three-factor model) is invariant in adults and in adolescents. Although, to date, no study has investigated MI across adolescents and adults, we hypothesise that their results will be invariant, because the meaning and understanding of shyness should be similar in both samples, since it is believed that shyness begins to stabilise after 14 years of age (Cheek & Tyson, 2009).

3. Adults are more shy than adolescents. Despite the fact, that there are no cross-sectional studies demonstrating significant differences between adults and adolescents, longitudinal studies (Karevold et al., 2012; Van Zalk et al., 2016) demonstrate an increase of shyness with age.

3. Method

3.1. Participants and procedure

3.1.1. Adults research

The study was attended by $N = 314$ adults (67.5% were women), aged 18–35 ($M_{\text{age}} = 22.02$; $SD = 2.75$). We used the snowball method to recruit participants—a direct link to the survey was shared on the Internet to reach out to a wide and diverse group of recipients.

3.1.2. Adolescents research

The study was attended by $N = 247$ first-grade high-school students (60.3% were girls), most aged 16 ($M_{\text{age}} = 15.95$; $SD = 0.22$). Research took place during the school hours with the consent of parents, teachers and headmasters.

3.2. Measures

In order to verify hypotheses, participants were given the RCBS scale (Cheek & Buss, 1981; polish adaptation: Kwiatkowska et al., *in press*) to complete. The RCBS scale consists of 13 items and a 5-point response scale. It has been demonstrated to display very good reliability among both adults and adolescents in the measurement of general shyness ($\alpha_{\text{adults}} = 0.91$; $\alpha_{\text{adolescents}} = 0.85$) and moderately acceptable to good in the measurement of shyness facets: General Social Distress ($\alpha_{\text{adults}} = 0.84$; $\alpha_{\text{adolescents}} = 0.65$); Stranger Shyness ($\alpha_{\text{adults}} = 0.70$; $\alpha_{\text{adolescents}} = 0.53$), and Assertiveness Difficulty ($\alpha_{\text{adults}} = 0.61$; $\alpha_{\text{adolescents}} = 0.49$).

3.3. Statistical analyses

In order to test Hypothesis 1, we used confirmatory factor analysis (CFA) with robust maximum likelihood estimation to assess the RCBS scale structure among adolescents. Due to the nature of the RCBS scale, which contains four negative formulated test items—we decided to add an additional method factor to the model (Podsakoff, MacKenzie, & Podsakoff, 2012). The method factor is not correlated with any other factor, which constrains the error variance to be equal across selected items, i.e., by introducing the method factor we controlled the measurement error resulting from the negative wording of items. In the assessment of the models we used two approximate indicators of model fit, i.e., Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). The model is considered to be a well-fitted to the data, if: CFI reaches a value >0.90 ; the RMSEA is <0.06 (Hu & Bentler, 1999).

In order to test Hypothesis 2 we assessed four levels of MI across the compared samples: the configural level determines whether CFA is accurate in both samples; the metric level determines whether subjects understand the meaning of latent construct in the same way; the scalar level determines whether the results of the latent variable can be compared with each other in a range of groups; and the strict level, which determines whether the measurement error is equal in compared groups, what enables between-group comparisons using summated scores (Meredith, 1993; Van de Schoot et al., 2012). Full MI can be stated if: (1) the difference between the configural and metric level and the difference between the metric and scalar level in CFI does not exceed 0.005, and (2) any difference between the levels in the range of the RMSEA coefficient should not exceed 0.010 (Chen, 2007). We applied the same criteria to the comparison between scalar and the strict level of invariance.

In order to test Hypothesis 3, after obtaining the MI in a range of samples to assess differences between adults and adolescents, we conducted an assessment of the differences in standardised latent mean scores.

4. Results

4.1. Verification of the measurement model of the RCBS scale

The model fit indices of the competing unifactorial and three-factor models (with and without the method factor) in adult and adolescent samples are presented in Table 1.

It was revealed that the models without method factor fit the data well in the adult sample, whereas in the adolescent sample the fit indicators fall below assumed criteria. The addition of the method factor improved the fit in both samples and models—it, thus, provides a basis for the conclusion that the structure of shyness, as measured by the RCBS scale, could be analysed using either a unifactorial or three-factor model, in both the adult and the adolescent samples; however, the impact of the negatively worded items is significant, especially within the adolescent sample. The standardised factor loadings of both samples and models, together with the content of test items, descriptive information for analysed samples, and the differences in the mean item level, are presented in an on-line Appendix.

The intercorrelations between shyness facets (both between the summated scores—calculated as the mean of corresponding items—and between the latent variables from the structural model) from the three-factor model are presented in Table 2.

The correlations between the summated scores were moderate in strength in both analysed samples, whereas the correlations between the latent variables were very high.

4.2. Measurement invariance of the RCBS scale

The results of MI analyses of the both models are presented in Table 3.

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