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Stability and change in personality type membership and anxiety in adolescence

Joyce Akse[a,*], William W. Hale III[a], Rutger C.M.E. Engels[b], Quinten A.W. Raaijmakers[a], Wim H.J. Meeus[a]

[a]*Utrecht University, Research Centre Adolescent Development, P.O. Box 80.140, 3508 TC Utrecht, The Netherlands*
[b]*Radboud University Nijmegen*

Abstract

Although the stability and changeability of personality has long been debated, many studies now agree that personality changes over the life course. Although the changes in rank-order and mean-level stability are well established, the stability in personality type membership during adolescence is not yet clear. Little research has been conducted on the associations between change in personality type membership and anxiety. A total of 827 adolescents (10–20 years) completed personality and anxiety questionnaires on 2 waves of the CONflict And Management Of RElationships study (CONAMORE). We found that the stability in personality type membership was moderate. The change from undercontroller to overcontroller was the most frequently occurring change. Furthermore, the stability in type membership was related to stability in anxiety level and change in type membership was related to anxiety change. More specifically, the resilient-overcontroller group demonstrated an increase in anxiety level, whereas the overcontroller-resilient group demonstrated a decrease.

Keywords: Personality type; Anxiety; Resiliency; Overcontrol; Undercontrol; Stability; Change

*Corresponding author. Tel.: +31 30 253 74 17; fax: +31 30 253 77 31.
E-mail address: J.Akse@fss.uu.nl (J. Akse).

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Introduction

'In most of us, by the age of 30, the character has set like plaster, and will never soften again.' This is a statement of William James (in Costa & McCrae, 1994; James, 1890, pp. 125–126) about the stability of personality. Based on an examination of the rank-order consistency of the Big Five personality traits, Costa and McCrae (1994) concluded that personality was stable for people over age 30. However, the existence of rank-order consistency in personality, which refers to the relative placement of individuals within a group, does not rule out the possibility of other types of change, such as individual-level change, mean-level change or change in personality profiles (Asendorpf, 1992; Roberts, Caspi, & Moffitt, 2001; Roberts & DelVecchio, 2000; Roberts, Walton, & Viechtbauer, 2006).

Although the stability and changeability of personality has long been debated, more and more studies now agree that personality changes over the life course (e.g. Lenzenweger, 1999; Lenzenweger, Johnson, & Willett, 2004; Roberts & DelVecchio, 2000; Roberts et al., 2006; Robins, Fraley, Roberts, & Trzesniewski, 2001; Santor, Bagby, & Joffe, 1997; Seivewright, Tyrer, & Johnson, 2002; Srivastava, John, Gosling, & Potter, 2003). As mentioned above, personality can change in several ways. For example, Roberts and DelVecchio (2000) found that the rank-order continuity of personality traits increased until the age of 50. Furthermore, in a meta-analysis by Roberts et al. (2006) was demonstrated that the mean level of personality traits changed across the life course; e.g. social dominance (facet of extraversion), emotional stability and openness increased during adolescence. Since rank-order and mean-level consistency are found to change, the specific constellations or profile of individuals on several personality traits could change as well (Morizot & Le Blanc, 2005) as could their personality type. The current study examines the continuity of the personality type membership in adolescence.

In general, adolescence is a period of pervasive change in physical, cognitive, emotional, and social competencies and concerns (Rice, 1999; Roberts et al., 2001; Steinberg & Silk, 2002). It is a period in which individuals attend a new school or get a new job, have new or changing friendships or romantic relationships and have changing relationships with their parents. It is not unlikely that these changes and the stressors that accompany them have an impact on personality and could lead to personality change (Asendorpf & Van Aken, 2003; Cyranowski, Frank, Young, & Shear, 2000; Pervin, 1994; Rice, 1999; Srivastava et al., 2003; Steinberg & Silk, 2002).

In personality research two major approaches can be distinguished. The first approach is the variable-centred approach, which focuses on differences among individuals on a given personality trait. An important taxonomy of personality traits has attracted much interest over the past years, namely the Big Five personality dimensions (John & Srivastava, 1999). One of the primary advantages of the Big Five framework is its ability to organize previous research findings on the development of personality traits into a manageable number of conceptually different domains (Roberts, Robins, Trzesniewski, & Caspi, 2003). However, an important disadvantage is that it ignores the individuals' personality structure as a whole (Asendorpf, 2003). The second approach in personality research is the person-centred approach, which focuses on the patterning and organization of traits within a person. Some advantages of this approach are that information on individuals' personality structure as a whole is preserved, at least in part, in the definition of the types and that it provides a descriptive efficiency as well as conceptual clarity (Robins & Tracy, 2003). The main disadvantages are that data on interindividual differences are lost in the

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transition from individual personality structure to personality types and that the types appear to have little utility for predictions from personality (Asendorpf, 2003). However, although both approaches have some advantages as well as disadvantages, they both add important insights into the understanding of personality (Caspi & Shiner, 2006). The current study replicates and extends recent work on the person-centred approach of personality (e.g. Dubas, Gerris, Janssens, & Vermulst, 2002; Hart, Hofmann, Edelstein, & Keller, 1997; Robins, John, Caspi, Moffitt, & Stouthamer-Loeber, 1996).

The personality typology of Block and Block (1980) is used to investigate stability and change in personality type membership in the present study. Block and Block describe personality in terms of two continuous concepts: ego-control and ego-resiliency. Ego-control refers to the tendency to contain emotional and motivational impulses versus the tendency to express them (overcontrol vs. undercontrol), whereas ego-resiliency refers to the tendency to respond flexibly rather than rigidly to changing situational demands, particularly stressful situations (e.g. Block & Block, 2006; Funder & Block, 1989; Huey & Weisz, 1997; Letzring, Block, & Funder, 2005).

Robins et al. (1996) studied the personality typology of Block and Block and found ego-resiliency to have an inverted U-shaped relation with ego-control and identified three distinct personality types: resilients, overcontrollers and undercontrollers. Resilients reflected a high level of ego-resiliency and a medium level of ego-control; overcontrollers and undercontrollers both reflected a low level of ego-resiliency; however, they differed markedly on ego-control: high and low, respectively. Additionally, Robins et al. (1996) demonstrated that these personality types exhibited a specific profile on the Big Five dimensions: resilients had a generally well-adjusted profile, with above average scores on all five dimensions. They were significantly more conscientious, emotionally stable and open to experience than the other types, significantly more extraverted than overcontrollers and significantly more agreeable than undercontrollers. The only dimension on which resilients were not highest was agreeableness; overcontrollers were the most agreeable of the three types. Overcontrollers were also low on extraversion and emotional stability. Undercontrollers were distinguished by their low levels of agreeableness and conscientiousness. Undercontrollers were also low on emotional stability and openness to experience. Consequently, it appeared that the personality types could be directly constructed on the basis of the Big Five questionnaire (Dubas et al., 2002). The personality types of Block and Block (1980) have been replicated in many studies using different informants, different methods and different statistical techniques (see: Asendorpf, Borkenau, Ostendorpf, & Van Aken, 2001), although the debate about the replicability of these personality types using an inverse factor analysis appears to be not settled yet (Asendorpf, 2006a, b; McCrae, Terracciano, Costa, & Ozer, 2006a, b).

Furthermore, it was demonstrated that these personality types differed in their psychosocial functioning. Compared to the other types, overcontrollers appeared to be more vulnerable to higher levels of internalizing problems and undercontrollers were found to be more prone to externalizing problems and moodiness and showed high levels of co-occurrence of internalizing and externalizing problem behaviours, whereas resilients exhibited the best psychosocial adjustment (Akse, Hale, Engels, Raaijmakers, & Meeus, 2004; Dubas et al., 2002; Hart et al., 1997; Robins et al., 1996; Van Aken & Dubas, 2004).

To our knowledge, stability and change in personality type membership based on the Block and Block typology in childhood and adolescence has been investigated in three studies only.

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Asendorpf and Van Aken (1999) found a moderate personality type stability in a 2-wave study: about 50% of 100 German children maintained their personality type membership over a 4-year time interval. Next, in a 2-wave study by Hart, Atkins and Fegley (2003) stability and change were described in three personality types over a 2-year period in childhood. They found that about 50% of several independent samples remained their type membership in both waves, while the other half changed. In a 3-wave study by Van Aken and Dubas (2004), stability and change of personality type membership were described in early adolescents over a 2-year period. They found that about 40% of the sample had the same personality type in three waves, whereas about 60% changed from one personality type to another over three waves. These findings seem to be in favour of the idea that the stability of personality type membership is low to moderate in childhood and adolescence (Asendorpf et al., 2001). Furthermore, Morizot and Le Blanc (2005) identified a developmental personality typology using data from a prospective longitudinal study of a representative sample of men assessed on four occasions (at 14, 16, 30 and 40 years of age). Although they reported promising findings about four developmental types and their associations with antisocial behaviour, they did not study a developmental typology on the basis of the Big Five personality dimensions in a sample with both genders and they did not examine the associations between the developmental typology and internalizing problem behaviours, which leaves the door wide open for studies that do address these issues, such as the present.

Generally, many studies have addressed the relationship between personality, personality disorders and internalizing problem behaviours (e.g. Block, Gjerde, & Block, 1991; Santor et al., 1997), such as anxiety, fewer have addressed the relationship between change in personality and anxiety. With respect to personality type membership, no study has yet examined the change in Block and Block's personality types with concurrent change in anxiety during adolescence. There are a number of reasons why it is important to study these associations: (a) personality type membership is related to problem behaviours (e.g. Dubas et al., 2002; Robins et al., 1996), such as anxiety, (b) personality type membership is only moderately stable and can thus change (Asendorpf & Van Aken, 1999), (c) anxiety has a high prevalence in adolescence (Costello & Angold, 1995) and its level changes during adolescence, dependent of the specific anxiety (Treffers, 2000), (d) the search for a developmental typology of internalizing problem behaviours has gained interest; several internalizing trajectories are already found (Van Lang, Ferdinand, Ormel, & Verhulst, 2006), and (e) personality maturations may parallel a decrease in anxiety (Caspi, Roberts, & Shiner, 2005). Since personality types are helpful in advancing theory and research in personality (Hart, Burock, London, Atkins, & Bonilla-Santiago, 2005), the personality types can contribute to the understanding of how change in personality is linked to change in problem behaviour. Therefore, it appears worthwhile to study the associations between change in personality type membership and anxiety.

In light of the aforementioned, we formulated the following three research questions and associated hypotheses. The first research question examines the stability of the personality type membership in adolescence. In line with Asendorpf and Van Aken (1999), Hart et al. (2003) and Van Aken and Dubas (2004), we hypothesize that personality type membership will demonstrate a low to moderate stability (about 50%) over 2 waves.

Our second research question is also derived from the study of Hart et al. (2003), in which was found that the change from overcontrollers to undercontrollers and from undercontrollers to

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overcontrollers occurred less often than other personality type changes in childhood. In the current study, we will try to replicate their findings in an adolescent sample.

Our final research question examines whether personality type membership is concurrently related to anxiety and whether change in personality type membership is related to change in anxiety level. We hypothesize that stable overcontrollers will have a higher level of anxiety than stable undercontrollers and resilients, as suggested by Robins et al. (1996) and Van Aken and Dubas (2004). Finally, we expect that when personality type membership changes to a type which is prone to anxiety, such as overcontrollers, the anxiety level will most likely increase. When personality type membership changes to a type that is not prone to anxiety, such as resilients, the anxiety level will most likely decrease.

Method

Procedure and sample characteristics

Participants in this study were drawn from the CONflict And Management Of RElationships study (CONAMORE), which is an ongoing longitudinal study of Dutch adolescents that examines their relationships with parents and peers as well as their emotional states (Meeus et al., 2002). For this study, the first two annual waves of CONAMORE were used, collected between 2001 and 2003. The participating adolescents were students from one of 12 participating high schools located in the province of Utrecht, The Netherlands. In the first wave, 906 adolescents filled in the Big Five questionnaire and the questionnaire about anxiety. The longitudinal sample consisted of 889 adolescents: 472 girls (53.1%) and 417 boys (46.9%). Two age groups were represented: 541 early adolescents (60.9%; $M_{\text{age}} = 12.35$; SD = .54; range = 10–15 years) and 348 middle adolescents (39.1%; $M_{\text{age}} = 16.66$; SD = .80; range = 16–20 years).

Before participation in the study, both students and their parents received written information describing the aims of the study and, if the student elected to participate, were required to provide written informed consent; less than 1% elected not to participate. Written informed consent was also obtained for all the participating schools. The administration was performed in the homeroom study period, during which the students could fill out the questionnaires anonymously. The research assistants, who attended the administration, gave verbal instructions about the questionnaires; written instructions were also included. The research assistants collected the completed questionnaires and conducted the data entry to ensure that the data remained anonymous. Students who were absent on the day of testing were invited for a second administration or received the questionnaire by regular mail.

Measures

Anxiety

The Screen for Child Anxiety Related Emotional Disorders (SCARED) is a self-report questionnaire, which is used to measure symptoms of DSM-IV linked anxiety disorders in children and adolescents (Birmaher et al., 1997; Hale, Raaijmakers, Muris, & Meeus, 2005). Generally, it has a good reliability as measured by the internal consistency and test–retest reliability and it shows good concurrent and discriminant validity (Birmaher et al., 1997; Muris &

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Steerneman, 2001; Muris, Merckelbach, Van Brakel, & Mayer, 1999). The SCARED consisted of 38 items and contained five subscales, namely panic symptoms (13 items), social anxiety symptoms (4 items), separation anxiety symptoms (8 items), generalized anxiety symptoms (9 items) and school phobia (4 items). In this study, overall anxiety was measured, so the subscales are not investigated separately. Sample items included 'When frightened, it is hard to breathe', 'I don't like to be with people I don't know', 'I get scared when I sleep away from home', 'I worry about others not liking me' and 'I get headaches or stomach aches when I am at school'. The items were scored on a 3-point scale, ranging from 'hardly ever', 'sometimes' to 'often'. In this study, the Cronbach's alpha was .94 at wave 1 and .90 at wave 2.

Personality

The personality dimensions Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Openness to Experience were measured using the shortened Dutch version of Goldberg's Big Five questionnaire (Gerris et al., 1998; Goldberg, 1992). Generally, it has a good reliability and construct validity, such as convergent and divergent validity (e.g. John & Srivastava, 1999; Smith & Snell, 1996). This questionnaire contained 30 items, such as: talkative (Extraversion), sympathetic (Agreeableness), systematic (Conscientiousness), worried (Emotional Stability) and creative (Openness to Experience). The adolescents judged whether the 30 items applied to themselves on a 7-point scale, ranging from 'absolutely agree' to 'absolutely disagree'. Cronbach's αs were high: .82, .80, .84, .78 and .66, respectively, at wave 1 and .84, .80, .85, .81, and .70, respectively, at wave 2.

We used the *k*-means clustering procedure to construct the personality types on the basis of the Big Five dimensions (Akse et al., 2004; Dubas et al., 2002) in both waves ($N = 889$; Fig. 1). This clustering procedure computes a mean for every individual and assigns the individual's profile to

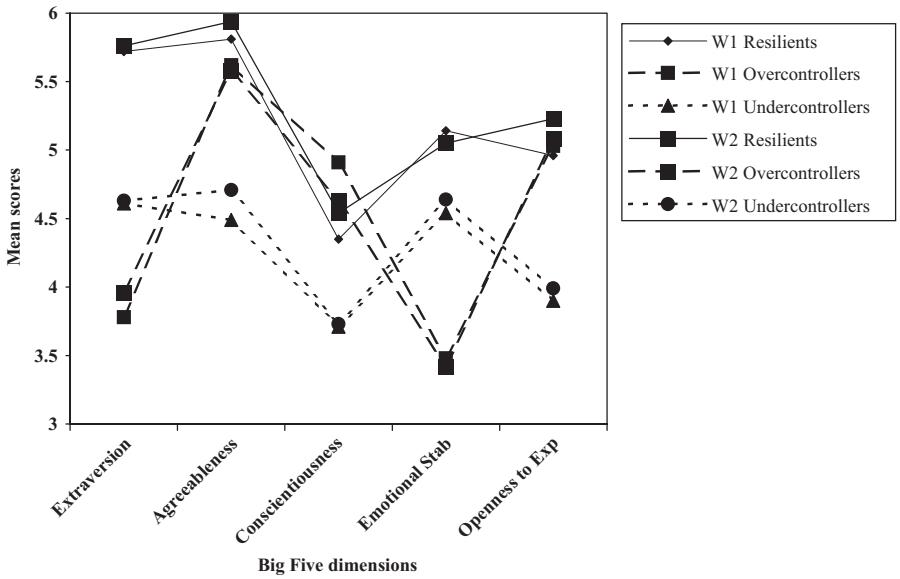

Fig. 1. The three personality types on the Big Five subscales in two waves. *Note*: Emotional Stab = Emotional Stability; Openness to Exp = Openness to Experience, W1 = wave 1; W2 = wave 2.

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one of the three clusters on the basis of the correspondence between the cluster centre and the individual's mean. The means within a cluster must correspond highly with each other, whereas the means between the clusters must differ highly from each other. Based on the findings of previous research in which three personality types were repeatedly found, we set the cluster number to three. Prior to the first set of cluster analyses, all dimensions scores were converted to *z*-scores. For the initial cluster centres we used a priori cluster centres derived from previous work on personality types (Van Aken & Dubas, 2004). More specifically, initial cluster centres for resilients were set at 0.5 on all Big Five dimensions. For the overcontrollers, the initial cluster centres were 0.5 for conscientiousness and agreeableness, and −0.5 for extraversion, emotional stability and openness. Finally, the initial cluster centres for undercontrollers were −0.5 for conscientiousness, agreeableness and openness, 0 for emotional stability and 0.5 for extraversion (Dubas et al., 2002).[1] In both waves we selected only those adolescents who scored within two standard deviations of the cluster centre, which they belonged to, leaving a group of 827 adolescents (Dubas, personal communication, July, 12, 2004). Since a more strict criterion would lead to a major decline in respondents, we chose the criterion of two standard deviations.[2] Following Dubas et al. (2002) we checked the replicability of the personality types by dividing each of the three samples randomly in two subsamples, rerunning the cluster analyses for each subsample and calculating the degree of correspondence of individuals being assessed to clusters of the total sample and of the subsamples. The kappa coefficients (Cohen, 1960) for the replication samples in each wave were excellent: .83 and .79 in wave 1 and .85 and .85 in wave 2.

Strategy of analyses

To answer research question 1 examining the stability of the type membership in adolescence and research question 2 examining whether the change from undercontroller to overcontroller and from overcontroller to undercontroller would be the smallest change, we performed general log-linear analyses (GLLM). The models tested here consisted of four factors (personality type at wave 1 (P_1), personality type at wave 2 (P_2), gender (G) and age (A)), interaction terms and covariates. The covariates were used to determine whether specific personality groups or combinations of personality groups occurred more or less often than others. The fit of the model was assessed by the likelihood ratio (L^2), an approximation of the chi square test (χ^2), with associated degrees of freedom (df). This goodness-of-fit measure is highly sample size dependent: with large samples it is very difficult to find a model that adequately and parsimoniously describes the empirical data (Miller, Acton, Fullerton, & Maltby, 2002; Tabachnik & Fidell, 2001; Von Eye & Niedermeier, 1999). Since the Bayesian Information Criterion (BIC) is a fit index that takes sample size into account, we will use this index to assess the fit. When comparing several models,

[1]For a comparison between these initial cluster centres and Asendorpf (2006)'s cluster centres, see Akse, Hale III, Engels, Raaijmakers, & Meeus (in press).

[2]We calculated the stabilities of the personality types over the two waves using the more strict criterion of 1 SD ($N = 538$). We found the following stabilities: RR = 56.6%, OO = 64.4%, UU = 48.8%, RO = 18.0%, RU = 25.4, OR = 22.0%, OU = 13.6%, UR = 24.4% and UO = 26.9%. These stabilities resemble the stabilities using the 2 SD-criterion very closely. Therefore, we can conclude that the fairly liberal selection of a stability criterion did not influence the 2-wave personality type stability.

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the model with the smallest (or largest negative) absolute value of the BIC is the preferred model (Raftery, 1985).

To answer the final research question we used ANOVAs to investigate whether anxiety changed in the total adolescent sample and in the nine personality groups over the two measurement waves. Repeated measures analyses with personality groups as between-subjects factor were performed in order to determine whether the personality groups differed in their mean anxiety level. Gender and age were entered as covariates controlling for possible gender and age group effects. Additionally, we conducted one way ANOVAs with Bonferroni post hoc tests on the difference scores for each personality group in order to determine whether the increase or decrease in anxiety differed between the personality groups.

Results

The means, standard deviations and the retest coefficients of the Big Five dimensions are presented in Table 1 for the total sample and the two age groups. We tested whether early and middle adolescents differed on the Big Five dimensions by means of a repeated measures ANOVA with age group as between-subjects factor. We found that the within-subjects effects of the separate Big Five dimensions were not significantly different between the age groups (range of Fs $(1, 825) = .34$–2.36; $p > .05$), indicating that the development of the separate Big Five dimensions was the same in both age groups. Furthermore, extraversion (F $(1, 825) = 6.23$; $p < .05$) and emotional stability (F $(1, 825) = 17.45$; $p < .001$) appeared to decrease over two waves since the mean levels were lower in middle than in early adolescents, whereas agreeableness (F $(1, 825) = 23.19$; $p < .001$) and openness (F $(1, 825) = 28.88$; $p < .001$) appeared to increase over two waves, since the mean levels were higher in middle than in early adolescents. Next, the rank-order stability of the Big Five dimensions appeared to increase from early to middle adolescents in extraversion ($p < .001$), conscientiousness ($p < .001$), emotional stability ($p < .001$) and openness ($p < .05$); no significant change occurred in agreeableness.

By means of the k-means clustering procedure we found 304 resilients in wave 1, of which 58.6% remained their type membership in wave 2, whereas 17.8% changed to overcontroller and 23.7% changed to undercontroller in the longitudinal sample. Furthermore, we found 217 overcontrollers in wave 1 of which 62.7% remained their type membership in wave 2, 24.0% changed to resilient and 13.4% changed to undercontroller. Finally, we found 306 undercontrollers in wave 1 of which 51.3% remained their type membership in wave 2, 22.5% changed to resilient and 26.1% changed to overcontrollers. Because participants might be assigned to the same personality type at the two measurement times simply as a result of chance and not as a function of personality continuity, we calculated the kappa coefficient which corrects for chance agreement, as was also done in Asendorpf and Van Aken (1999; kappa = .30). The Cohen's kappa in the current study was .38.

Furthermore, the distribution of the types differed within the genders: there were more male resilients and male undercontrollers than male overcontrollers in wave 1 (33.7%, 42.7%, 23.6%, respectively), whereas there were more male undercontrollers than male resilients and male overcontrollers in wave 2 (39.4%, 30.8%, 29.8%, respectively). Also, there were more female resilients than female overcontrollers and female undercontrollers in wave 1 (39.5%, 28.6%,

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Table 1
Means and standard deviations of the Big Five dimensions on two waves and the correlations between the Big Five dimensions for the total sample and both age groups

	Extraversion		Agreeableness		Conscientiousness		Emotional Stability		Openness	
	Wave 1 M (SD)	Wave 2 M (SD)	Wave 1 M (SD)	Wave 2 M (SD)	Wave 1 M (SD)	Wave 2 M (SD)	Wave 1 M (SD)	Wave 2 M (SD)	Wave 1 M (SD)	Wave 2 M (SD)
Total ($N = 827$)	4.79 (1.07)	4.83 (1.07)	5.26 (.78)	5.44 (.71)	4.24 (1.07)	4.29 (1.11)	4.48 (1.03)	4.38 (1.01)	4.63 (.88)	4.81 (.85)
Early ($n = 502$)	4.87 (1.01)	4.87 (1.04)	5.19 (.81)	5.34 (.77)	4.22 (1.02)	4.26 (1.06)	4.60 (1.04)	4.46 (1.02)	4.51 (.89)	4.70 (.88)
Middle ($n = 325$)	4.66 (1.13)	4.75 (1.10)	5.38 (.73)	5.58 (.59)	4.27 (1.14)	4.35 (1.17)	4.29 (.98)	4.25 (.99)	4.82 (.83)	4.98 (.78)
	Wave 1–Wave 2		Wave 1–Wave 2		Wave 1–Wave 2		Wave 1–Wave 2		Wave 1–Wave 2	
	r		r		r		r		r	
Total ($N = 827$)	.57**		.44**		.65**		.51**		.60**	
Early ($n = 502$)	.50**		.41**		.57**		.43**		.55**	
Middle ($n = 325$)	.67**		.49**		.75**		.62**		.66**	

Table 2
The nine personality groups composed of the original three personality types measured on the two waves

		Wave 2			
		R	O	U	Total
	R	1 178 (58.6%)[a]	2 54 (17.8%)	3 72 (23.7%)	304
Wave 1	O	4 52 (24.0%)	5 136 (62.7%)	6 29 (13.4%)	217
	U	7 69 (22.5%)	8 80 (26.1%)	9 157 (51.3%)	306
	Total	299	270	258	827

[a]Percentages within cells sum up to 100% within rows.

32.0%, respectively), whereas there were more female resilients and female overcontrollers than female undercontrollers in wave 2 (40.8%, 35.1%, 24.0%, respectively; Table 2).

Additionally, the distribution of the types differed within the age categories: there were more resilients and undercontrollers than overcontrollers in the younger group in wave 1 (37.1%, 41.8% and 21.1%, respectively), whereas the personality types of the younger adolescents in wave 2 were more evenly distributed (resilients: 35.8%, overcontrollers: 27.3%, undercontrollers: 37.5%). However, there were more resilients and overcontrollers than undercontrollers in the older group in both waves (36.3%, 34.2% and 29.5%, respectively, in wave 1; 37.5%, 40.9% and 21.5%, respectively, in wave 2).

Stability and change of personality type membership

While a small majority of students (56.9%) remained their type membership over both waves, the remaining adolescents (43.1%) were classified differently from wave 1 to wave 2. Hence, nine personality patterns occurred (Table 2): three groups that reflected the same type membership over the two waves, namely 'stable resilients'(RR), 'stable overcontrollers' (OO) and 'stable undercontrollers' (UU), and six groups that reflected a change in their type membership, namely 'resilient-overcontrollers' (RO), 'resilient-undercontrollers' (RU), 'overcontroller-resilients' (OR), 'overcontroller-undercontrollers' (OU), 'undercontroller-resilients' (UR) and 'undercontroller-overcontrollers' (UO).

General log-linear analyses (GLLM) were conducted to investigate longitudinal change in the three personality types with gender and age as additional co-varying variables. Hence, a cross-table analysis was performed on a $3 \times 3 \times 2 \times 2$-table, of which Table 2 (3×3-table) is a simplified version. In GLLM, the BIC can be used to determine whether a model fits the data well; the smaller the BIC, the better the fit. The null model (i.e. model 1) included the main effects for personality type at both waves (P_1, P_2), gender (G) and age (A) and all 2-way ($P_1 \times G$, $P_1 \times A$, $P_2 \times G$, $P_2 \times A$, $G \times A$) and 3-way interactions ($P_1 \times G \times A$, $P_2 \times G \times A$). However, the interaction term assessing stability and/or change of the type membership on both waves ($P_1 \times P_2$) was not included in the null model. This model (L^2 (16, $N = 827$) $= 202.66$, $p < .001$;

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Table 3
Log-linear models of stability and change in personality

Models	L^2	df	p	BIC
1. Null model	202.66	16	<.001	95.18
2. Model 2 (P1 × P2 added to null model)	13.99	12	>.05	−66.62
A. Model 1 + Covariate '9 separate changes'	52.00	15	<.001	−48.77
B. Model 1 + Covariate 'Stability vs. Change'	25.68	15	<.05	−75.09
C. Model 1 + Covariate 'Stability−Change−UO'	24.63	15	>.05	−76.14

BIC = 95.18) had a high BIC, and since only models that have a low BIC have a good fit in GLLM, this model did not fit the data well.

Therefore, in the second model the interaction term assessing stability and/or change of type membership on wave 1 and 2 ($P_1 \times P_2$) was added, which increased the fit significantly; this model fit the data well (L^2 (12, $N = 827$) = 13.99, $p > .05$; BIC = −66.62). We also tested whether the fit would increase even more when adding the interaction term between the types on wave 1 and 2 and gender ($P_1 \times P_2 \times G$; L^2 (8, $N = 827$) = 11.73, $p > .05$; BIC = −42.01) or age ($P_1 \times P_2 \times A$; L^2 (8, $N = 827$) = 4.19, $p > .05$; BIC = −49.55); but, although the fit increased somewhat, this did not lead to a more negative BIC than the BIC of model 2; therefore, model 2 remained the best fitting model. Since the interaction between the personality types on both waves improved the fit of the null model significantly ($\Delta L^2 = 188.67$, $\Delta df = 4$, $\Delta BIC = 161.80$), we can conclude that the stability in personality type membership differed between the personality groups over two waves.

To test our first hypothesis, we examined the interaction more specifically by using specified covariates instead of relying only on interaction effects. Several covariates were defined to study the stability and change of type membership. In the first analysis (i.e. model A in Table 3) the covariate was defined as each personality group being an independent entity; this means that every cell of the 3 × 3-table was defined separately and that each of the nine transitions in personality had a different frequency. This model fit the data well and, compared to the null model, the fit increased significantly ($\Delta L^2 = 150.66$, $\Delta df = 1$, $\Delta BIC = 143.95$). In the second analysis (i.e. model B in Table 3), the covariate was defined as the stable groups being one collective entity and the changed groups being another collective entity; this means that groups 1, 5 and 9 were combined to form the 'stable' groups and that the remaining groups were combined to form the 'changing' groups. This model also fit the data well and, compared to the null model as well as to model A, the fit increased significantly ($\Delta L^2 = 176.98$, $\Delta df = 1$, $\Delta BIC = 170.27$; $\Delta L^2 = 150.66$, $\Delta df = 0$, $\Delta BIC = 26.32$, respectively). While other hypothetical models were also tested using covariates, none of these models had an equally good fit as model B. Therefore, we can conclude that the nine personality patterns could be divided into 2 large groups, namely the personality groups that remained their type membership and the personality groups that changed their type membership. The groups that remained their type membership occurred more frequently than the groups that changed. However, both stability (56.9%) and change (43.1%) in personality type membership were found. Since we found a moderate stability of personality type membership, our first hypothesis was supported.

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To test our second hypothesis, we examined whether the change from overcontroller to undercontroller and the change from undercontroller to overcontroller occurred less often than other changes. We tested several covariates with the stable personality groups as one entity, the overcontroller–undercontroller group and/or undercontroller–overcontroller group as another, and the remaining changed groups as a third entity (Table 3). We will only describe the final best fitting model, which is model C. Model C is defined as the stable groups being one separate entity, the undercontroller–overcontroller group being the second separate entity and the overcontroller–undercontroller group combined with the remaining changing groups as the third entity. This model (BIC = −76.14) had a more negative BIC and thus fit the data better than the null model (BIC = 95.18) and than model B (BIC = −75.09). Inspection of Table 1 shows that the cell frequency of the change from undercontroller to overcontroller (26.1%) is higher than that of the other changes (mean cell frequency = 20.3%). Therefore, we can conclude that the change in type membership from undercontroller to overcontroller occurred more frequently than all the other changes in type membership. In an additional model, defined as the stable groups being one separate entity, the overcontroller−undercontroller group being the second separate entity and the undercontroller−overcontroller group combined with the remaining changing groups as the third separate entity, we tested whether the change from overcontroller to undercontroller occurred less often than the other personality changes, but this was not the case. The fit indices of the models, that were defined with the covariates, are presented in Table 3. Since we expected to find that both the change from undercontroller to overcontroller and from overcontroller to undercontroller occurred less often than other changes, our findings did not support the second hypothesis.

Stability and change in personality type membership and anxiety level

The means, standard deviations and effect sizes of anxiety for the total sample and the nine personality groups are presented in Table 4. Differences between the nine personality groups and anxiety for the two waves were determined by an ANOVA with repeated measures for anxiety, personality groups as between subjects factor and gender and age groups as covariates; Bonferroni post hoc tests were included.

The ANOVAs demonstrated that anxiety ($F(1, 816) = 1516.54$, $p < .001$, $\eta^2 = .65$) was significantly higher in wave 1 compared to wave 2. Gender ($F(1, 816) = 24.97$, $p < .001$, $\eta^2 = .03$) also showed significant effects: girls were more anxious than boys. Furthermore, no significant age differences were found. More importantly, the personality groups ($F(8, 816) = 22.85$, $p < .001$, $\eta^2 = .18$) showed significant effects. Since we found many significant differences between the personality groups on anxiety across the waves, we inspected the individual group means for possible homogenous subsets. It appeared that personality groups that scored highest on anxiety were the personality groups that consisted of overcontrollers in wave 1 or 2 but not resilients, whereas the personality groups that scored lowest on anxiety consisted of resilients in wave 1 or 2, but not overcontrollers. On the basis of these differences in means across waves on anxiety we constructed three subsets (Table 4). Subset 1 consisted of personality groups that were overcontroller on wave 1 or 2, but were not resilient on either wave (i.e. OO, OU, UO). Subset 3 consisted of personality groups that were resilient on wave 1 or 2, but were not overcontroller on either wave (i.e. RR, RU, UR) and the remaining personality groups were grouped into subset 2

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Table 4
Descriptives of anxiety for total sample, gender, age, personality groups and subsets on the two waves

		Wave 1	Wave 2	t – test	Effect size	Retest coefficients	Mean scores across waves	Mean subset scores across waves
	N	M (SE)	M (SE)	p	η_p^2	r	M (SE)	M (SE)
Total	827	49.48 (.43)	49.32 (.33)	$>.05$	.01	.48*	49.40 (.38)	
Gender								
Boys	386	47.86 (.62)[a]	47.57 (.46)[a]	$>.05$	.03	.36*	47.72 (.54)	
Girls	441	50.43 (.48)[b]	50.43 (.43)[b]	$>.05$	.00	.60*	50.43 (.46)	
Age								
Early adolescents	502	49.32 (.52)	48.79 (.43)	$>.05$	.05	.43*	49.06 (.48)	
Middle adolescents	325	49.09 (.58)	49.57 (.47)	$>.05$	−.05	.57*	49.33 (.50)	
Personality groups								
Subset 1						.58*		54.90 (.51)[a]
Stable overcontrollers (OO)	136	55.52 (.91)	55.38 (.71)	$>.05$	−.00	.60*	55.45 (.68)	
Overcontroller-undercontrollers (OU)	29	54.20 (1.96)	52.20 (1.53)	$>.05$	.17	.52*	53.20 (1.47)	
Undercontroller-overcontroller (UO)	80	51.89 (1.17)	53.54 (.92)	$>.05$	−.15	.58*	52.72 (.88)	
Subset 2						.31*		48.79 (.49)[b]
Stable undercontrollers (UU)	157	49.43 (.85)	48.84 (.66)	$>.05$	.07	.28*	49.14 (.64)	
Resilient-overcontrollers (RO)	54	46.46 (1.43)	50.72 (1.12)	$<.001$	−.54	.54*	48.59 (1.07)	
Overcontroller-resilients (OR)	52	49.39 (1.46)	46.56 (1.14)	$<.05$	.32	.35*	47.97 (1.09)	
Subset 3						.24*		45.53 (.44)[c]
Undercontroller-resilients (UR)	69	48.70 (1.27)	45.54 (.99)	$>.05$	.30	.00	47.12 (.95)	
Resilient-undercontrollers (RU)	72	44.68 (1.43)	46.35 (.97)	$>.05$	−.20	.22	45.52 (.93)	
Stable resilients (RR)	178	45.08 (.79)	44.75 (.62)	$>.05$	.05	.52*	44.92 (.59)	

[a, b, c]Means with different superscripts are significantly different at $p<.05$ or better; *: $p<.01$.

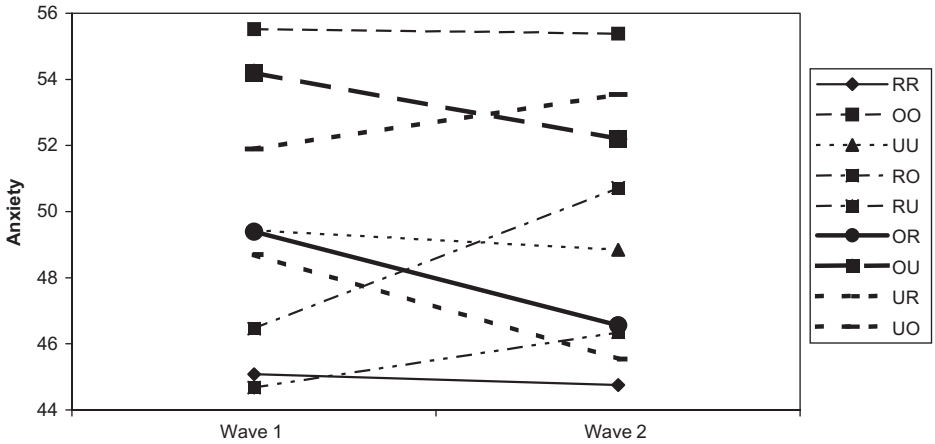

Fig. 2. Nine personality groups on anxiety in waves 1 and 2.

(i.e. UU, RO, OR). We repeated the repeated measures ANOVA in the same way as described above, but now with the personality subsets as between subjects factor. This ANOVA showed the same results on anxiety, gender and age, and additionally showed significant effects for the personality subsets ($F(2, 822) = 85.04$; $p < .001$, $\eta^2 = .17$): subset 1 scored significantly higher on anxiety than subset 2 ($p < .001$) and 3 ($p < .001$) and subset 2 scored significantly higher on anxiety than subset 3 ($p < .001$). This means that the subset in which adolescents were overcontroller but not resilient in wave 1 or 2 showed significantly more anxiety than the subset in which adolescents were resilient but not overcontroller in wave 1 or 2, while the subset with stable undercontrollers and personality groups that were resilient and overcontroller in wave 1 and 2 showed an intermediate level of anxiety.

Additionally, the ANOVAs demonstrated that the interactions anxiety × gender and anxiety × age were not significant, whereas the interaction anxiety × personality groups was significant ($F(8, 816) = 3.10$, $p < .01$, $\eta^2 = .03$; Fig. 2). Since it is not possible to compare all the changes in the personality groups with each other in a single repeated measures analysis, we calculated difference scores, subtracting the anxiety score on wave 1 from the anxiety score on wave 2, followed by a oneway ANOVA with the personality groups as between subjects factor and the difference scores of anxiety as the dependent variable. We found a significant difference in change between the resilient-overcontroller group and the overcontroller-resilient group ($p < .05$): the resilient-overcontroller group increased in their level of anxiety across the waves, whereas the overcontroller-resilient group decreased in their level of anxiety. No significant differences between other groups were found.

Additional analyses were conducted to study whether the change in anxiety level was significant within the total group, genders, age groups and personality groups. For each group *t*-tests were performed and effect sizes (i.e. partial èta squared or η_p^2) were calculated. Although we did not find any significant differences or effect sizes within the total group, boys, girls, young and middle adolescents, we did find significant changes within the personality groups on the change in anxiety level. First, the personality groups that remained their type membership demonstrated no

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significant changes in anxiety. Second, although only two personality groups showed a significant change in anxiety level, namely the resilient-overcontroller group and the overcontroller-resilient group, four personality groups demonstrated a small to medium effect size, namely the resilient-overcontroller group, the overcontroller-resilient group, the resilient-undercontroller group, and the undercontroller-resilient group. These small to medium effect sizes indicated that the anxiety level actually changed from wave 1 to 2 in these personality groups. More specifically, the personality groups that changed to resilient, such as the overcontroller-resilient group and the undercontroller-resilient group, showed a decrease in anxiety level, whereas the personality groups that changed to non-resilient, such as the resilient-overcontroller group and the resilient-undercontroller group, showed a significant increase in anxiety level.

Since there could be some overlap in content between the Big Five dimension emotional stability and anxiety, we tested whether emotional stability on wave 1 predicted anxiety on wave 2, controlling for the relation between emotional stability and anxiety on wave 1. We found that emotional stability on wave 1 predicted anxiety on wave 2 ($\beta = -.21$, $p < .001$)[3], when controlling for the co-occurrence of emotional stability and anxiety on wave 1. The squared multiple correlation of anxiety was .27, which implies that more than 70% of the variance in anxiety is explained by other variables than emotional stability. In other words, the content overlap between emotional stability and anxiety probably is rather low.

Discussion

The purpose of this study was to examine the stability of personality type membership in adolescence and whether change in personality type membership was related to change in anxiety level. In order to do so, we examined three research questions. The first research question focused on the stability of personality type membership during adolescence. As expected, we demonstrated that type membership remained the same for a small majority of adolescents, whereas the type membership changed for a large minority of adolescents. These findings are congruent with several studies that also demonstrated a moderate stability in personality type membership (Asendorpf & Van Aken, 1999; Hart et al., 2003; Van Aken & Dubas, 2004). Since adolescence is a period in which several changes in many developmental domains occur (Rice, 1999; Steinberg & Silk, 2002), personality type membership seems to be one of the domains that is also prone to change.

The second research question examined whether the findings of Hart et al. (2003), that the personality change from overcontroller to undercontroller and from undercontroller to overcontroller occurred less frequently than other personality changes, could be replicated. However, this was not demonstrated in the current study. According to our findings the change from overcontroller to undercontroller occurred as often as other personality changes. Moreover, the change from undercontroller to overcontroller occurred *more* frequently than other personality changes. Although we did not expect this finding, the following explanation might be given. It is known that undercontrollers are very impulsive and often have academic and behavioural problems, which could be a possible cause for serious conflicts with other people. The negative feelings that are related to these conflicts might cause a negative mood (Akse et al., 2004; Dubas et al., 2002), which could lead them to exhibit more overcontrolling characteristics and

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could ultimately lead to an overcontrolling personality. Indeed, these findings are in contrast with Hart et al. (2003), but it should be noted that in their study these individual type membership changes were not tested explicitly; they only described the frequencies of the nine possible personality changes in their samples. Obviously, more research is needed to replicate our findings and, as Hart et al. (2005) point out, to examine what processes or characteristics of these adolescents account for the changes in their personality type membership.

The third and final research question examined whether personality change was associated with change in anxiety level. We would like to point out that, although one of the Big Five dimensions, i.e. emotional stability, is associated with anxiety, personality and anxiety should be considered as distinguishable concepts. We acknowledge that personality aspects, such as emotional stability, could make a person more prone to developing problem behaviour, such as anxiety. However, according to the diathesis-stress model anxiety only develops when low levels of emotional stability occur simultaneously with certain environmental influences (e.g. Brozina & Abela, 2006; John, Caspi, Robins, Moffitt, & Stouthamer-Loeber, 1994; Koçkar & Gençöz, 2004; Muris, De Jong, & Engelen, 2004). In addition to emotional stability, the Big Five contains other dimensions, that are also related to problem behaviour (Ehrler, Evans, & McGhee, 1999).[3] Therefore, the associations we find in this study are not solely due to the associations between emotional stability and anxiety.

We found that stable overcontrollers were more anxious than stable undercontrollers and stable resilients and that stable undercontrollers were more anxious than stable resilients. This is in line with other studies that also found that overcontrollers generally have the highest level of internalizing problem behaviour (e.g. Robins et al., 1996; Van Aken & Dubas, 2004). These findings support our third hypothesis.

Additionally, we found that three personality subsets differed significantly from each other on the mean level of anxiety. This means that adolescents who were overcontroller, but were not resilient in either wave (i.e. subset 1), were most anxious compared to the other subsets. However, the subset in which the adolescents were resilient, but were not overcontroller in either wave (i.e. subset 3), were least anxious. Although resiliency is not a definite protective factor for developing anxiety, it suggests that adolescents who are classified as resilients but not as overcontrollers generally have a better ability to recover from negative events (Olsson, Bond, Burns, Vella-Brodrick, & Sawyer, 2003), which could explain the lower anxiety level in this group.

[3]Additional analyses were performed using AMOS (Arbuckle, 1995) for the total sample ($N = 827$). We calculated the co-occurrence between emotional stability and anxiety on wave 1, the stability paths within emotional stability and within anxiety and the bidirectional crosspaths between the constructs. The fit of the model was low (χ^2 (1) = 112.80, $p < .001$, NFI = .86, CFI = .86, RMSEA = .37, AIC = 138.80). We found that the wave 1 co-occurrence of emotional stability and anxiety was $r = -.41$, that the stability of emotional stability was $\beta = .45$ and that the stability of anxiety was $\beta = .40$. Furthermore, we found that emotional stability on wave 1 predicted anxiety on wave 2 ($\beta = -.21$, $p < .001$) and that anxiety on wave 1 predicted emotional stability on wave 2 ($\beta = -.14$, $p < .001$). The squared multiple correlations were .27 for both emotional stability and anxiety. Furthermore, we performed a hierarchichal regression analysis with anxiety on wave 2 as a dependent variable and anxiety and the Big Five dimensions on wave 1 as predictors. When controlling for anxiety ($\beta = .38$, $p < .001$) and emotional stability ($\beta = -.16$, $p < .001$) on wave 1, we found that extraversion was the only Big Five dimension that significantly predicted anxiety on wave 2 ($\beta = -.11$, $p < .01$).

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Change in personality type membership and change in anxiety level

Not only clear differences between the personality groups in the mean level of anxiety were found, also clear differences between the personality groups in the changes of anxiety level emerged. First of all, when type membership remained stable, the level of anxiety remained stable. Although the three stable personality groups exhibited a significantly different mean level of anxiety, their change in anxiety was the same (i.e. no change occurred).

Second, the resilient-overcontroller group increased in their level of anxiety, whereas the overcontroller-resilient group decreased in their level of anxiety, which suggests that when type membership changed to a personality type prone to internalizing problems, the anxiety level increased. The opposite seemed also true: when type membership changed to a type that is resilient, the anxiety levels decreased. Our findings also suggest that when personality changed in the opposite direction, the level of anxiety changed in the opposite direction. Although we only found a significantly different change of anxiety between the resilient-overcontroller group and the overcontroller-resilient group, a similar pattern appeared to be present between the resilient-undercontroller group, in which the anxiety level increased, and undercontroller-resilient group, in which the anxiety level decreased; and also between the overcontroller-undercontroller group, in which the anxiety level decreased, and undercontroller-overcontroller group, in which the anxiety level increased (Fig. 2). In these latter groups an opposite change in type membership seemed also to be related to an opposite change in anxiety, although not significant. Obviously, in order to confirm this pattern of opposites, more research is needed.

Third, it is noteworthy that the differences between the personality groups in change of anxiety level are particularly present in the resilient and overcontroller groups, which were also important personality features in the discussion of the personality subsets, suggesting that the overcontroller and resilient aspects of personality are especially important in anxiety development, as can be expected on the basis of prior research (e.g. Dubas et al., 2002; Robins et al., 1996).

Additional findings

Gender, age and anxiety

Boys and girls demonstrated clear differences in anxiety level. We found that girls were more anxious than boys, which is congruent with findings of several other studies (e.g. Hale et al., 2005; Muris et al., 2004; Norton, Buhr, Cox, Norton, & Walker, 2000). We did not find any differences between the age groups in anxiety level. This is in contrast with findings of Verhulst and Verheij (2000) and Wenar and Kerig (2000), who claim that the level of anxiety is higher in older than in younger adolescents; however, in the study by Allsopp and Williams (1991) no age differences were detected. Finding significant differences in anxiety level between age groups in adolescence could depend on the specific anxiety that is studied: e.g. separation anxiety symptoms are likely to decrease during adolescence, whereas social anxiety symptoms are likely to increase (Craske, 1997). Furthermore, both gender and age did not demonstrate any differences in the change of anxiety level, which means that anxiety develops in the same way for both genders and both age groups. Thus, on the basis of these findings we would suggest that although the mean level of anxiety could be different, as is the case for boys and girls, the development or change in anxiety does not differ between the groups.

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Personality trait continuity

On the basis of significant differences between early and middle adolescents on the Big Five dimensions, we demonstrated that agreeableness and openness increased, whereas extraversion and emotional stability decreased during adolescence, which is only partly in agreement with Roberts et al.(2006)'s meta-analysis. We also demonstrated that in addition to the differences between the early and middle adolescents on the mean levels of the Big Five dimensions, the development of the Big Five dimensions over two waves was the same in both age groups.

Furthermore, we found that the rank-order stability of the Big Five dimensions increased in extraversion, conscientiousness, emotional stability and openness during adolescence; however, no change occurred in agreeableness. In a meta-analysis of Roberts and DelVecchio (2000) was reported that the trait consistency of Big Five personality dimensions increased with age, including from childhood to adolescence and from adolescence to young adulthood. This process of an increase in trait consistency also occurs during adolescence, at least so it seems for extraversion, conscientiousness, emotional stability and openness.

Limitations and future research

In addition to the aforementioned findings, a few limitations of the present study need to be addressed. The first limitation is that our findings are solely based on adolescent self-reports, which could result in biased answers. However, since internalizing behaviours might be more difficult to observe to others (Achenbach, McConaughy, & Howell, 1987), we were more interested in the feelings and opinions of the adolescents themselves.

A second limitation of this study is that only subclinical levels of anxiety were assessed. Although the data reported here can be used as a baseline for clinical populations, they do not meet clinical criteria and the results of this study should not be equated with those from studies of adolescents with psychiatric disorders (Gjerde, Block, & Block, 1988; Kim & Smith, 1998).

A final limitation is that the relationship between personality and anxiety is not causal. Since we measured the change in type membership and change in anxiety simultaneously, it is not possible to conclude that either change in type membership causes changes in anxiety or that anxiety change causes change in type membership. As Hart et al. (2005) point out more longitudinal research is needed to examine what causes adolescents to change their type membership and also what are the consequences of changes in type membership.

Finally, we suggest more research on the change in the personality types and its associations with problem behaviours. Since developmental personality types are known to differ in their mean level of externalizing problem behaviour (Morizot & Le Blanc, 2005), especially in under-controllers, we suggest that studies on the association between personality type change and change in externalizing problem behaviour should be conducted as well.

Conclusion

In this study a moderate stability of type membership was found during adolescence. An important finding was that besides the non-changing groups the change from undercontroller to overcontroller was the most frequently occurring change in type membership. Furthermore,

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specific changes in type membership were associated with specific levels of anxiety and specific changes in type membership were associated with specific changes in anxiety level. Generally, it appeared that stability in type membership was related to stability in anxiety level and that (contrary) change in type membership was related to (contrary) change in anxiety level. Finally, clear differences were found between early and middle adolescents on the rank-order and mean-level continuity of the Big Five personality dimensions.

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