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Age differences in the severity, impact and relative importance of dynamic risk factors for recidivism

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ABSTRACT

Research in adolescent populations has shown that the severity, impact, and relative importance of dynamic risk factors for recidivism changes over the course of adolescence. This study examined whether there were age differences in the severity, impact, and relative importance of dynamic risk factors for recidivism in an adult offender population. The sample consisted of 8665 Dutch offenders and was divided into four age groups: 18–25 years old, 26–30 years old, 31–40 years old, and 41 + years old. The results showed that the severity and impact of dynamic risk factors varied across the age groups. An increase of the impact of dynamic risk factors was found over the course of adulthood, indicating that dynamic risk factors had a larger predictive power for recidivism in the older age groups. The relative importance of the risk factors also varied across age. In late adolescence, recidivism was most strongly predicted by problems in the education, alcohol use, and peer domains, whereas in adulthood, problems with drugs and alcohol were the most important predictors of recidivism. Results emphasize the importance of directing offender treatment at high risk offenders, and the focus on age specific criminogenic needs to maximize the effect of treatment.

1. Introduction

In order to reduce the risk of recidivism among offenders, it is important to have knowledge about which dynamic (treatable) risk factors most strongly associate with recidivism. According to the need-principle of effective offender rehabilitation, interventions will be most successful in reducing recidivism when addressing the dynamic risk factors most strongly related to recidivism (Andrews & Bonta, 2010a). Recent studies on adolescent offender populations have shown that the strength of the relationship between risk factors and recidivism depends on the age of the offender (Van der Put et al., 2010; Van der Put et al., 2012), implying that rehabilitative efforts should take these age differences into account in order to increase their effectiveness. To our knowledge, there are very few studies on age differences in the relationship between risk factors and recidivism in adult offender populations. However, this knowledge is very important in order to refer offenders to the appropriate rehabilitative interventions. Therefore, the aim of our study was to examine age differences in the relationship between dynamic risk factors and recidivism in adult offenders.

1.1. Dynamic risk factors

The need principle is part of the risk-need-responsivity (RNR) model (see Andrews & Bonta, 2010a) which has been widely regarded as the most important model for guiding offender assessment and treatment (e.g., Blanchette & Brown, 2006; Ward, Mesler, & Yates, 2007). This model states that there are three general principles for effective offender rehabilitation interventions: (a) the risk principle: the level of treatment intensity must be matched to the offenders' risk of recidivism, which means high-intensive interventions for high-risk offenders and minimal intervention for low-risk offenders; (b) the need principle: the intervention must target the criminogenic needs (dynamic risk factors); and (c) the responsivity principle: the style and mode of the intervention must be matched to the offender's personality, motivation, learning style and abilities (Andrews & Bonta, 2010a, 2010b; Andrews, Bonta, & Hoge, 1990). As stated in the RNR model, criminogenic needs are an important factor in referring offenders to the appropriate interventions to reduce recidivism. Criminogenic needs can be defined as dynamic (treatable) risk factors for recidivism. Meta-analyses of the risk and/or need factors with diverse offender groups have increased our knowledge of major, moderate, and minor need factors (Bonta, Law, & Hanson, 1998; Gendreau, Little, & Goggin, 1996; Hanson & Morton-Bourgon, 2004; Lipsey & Derzon, 1998). Examples of

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major need factors are antisocial personality pattern (e.g. weak self-control, impulsive, adventurous pleasure seeking, aggressive and irritable), antisocial cognition (e.g. attitudes, values and beliefs supportive of crime), antisocial associates and substance abuse (Andrews, Bonta, & Wormith, 2006). Minor risk factors are, among others, personal and/or emotional distress, physical health issues, and social class of origin (Andrews et al., 2006).

1.2. Severity, impact, and relative importance of dynamic risk factors

The severity of dynamic risk factors for delinquency and recidivism is dependent on the age of the offender. Loeber, Slot, and Stouthamer-Loeber (2008) show with their "developmental model of onset, accumulation, and continuity of risk factors", that the severity of risk factors for delinquency increases as children grow older, peaks during adolescence and then decreases throughout adulthood. Risk factors in the individual and family domain are most prevalent in early childhood. Peer and school risk factors appear in middle childhood, and community and work-related factors in adolescence and adulthood (Loeber et al., 2008).

It is not only the *severity* of risk factors that changes throughout life; we also see a change in the *impact* of the risk factors for recidivism. Recent studies in adolescent samples, for example, showed that the value of predicting recidivism of dynamic risk factors in the individual domain (attitude, skills, and aggression) and the social domain (school, family, relationships) decreased with age (Van der Put et al., 2010; Van der Put et al., 2012). In addition, Spanjaard, Van der Knaap, Van der Put, and Stams (2012) found an overall increase in the impact of risk factors from 18 to 29 years old, with the strongest increase for the alcohol domain. As a result of the decreasing or increasing impact of risk factors on recidivism, the potential effect of interventions aimed at these risk factors may also change (Andrews & Bonta, 2010a). Therefore, it is important to understand how the impact of dynamic risk factors for recidivism changes over the course of life.

The change in the impact of the various risk domains is not homogeneous. The *relative importance* of the risk factors changes as well: the impact on delinquent behavior of some risk factors decreases with age, while the impact of other factors increases. For example, the influence of peers on offenders' behavior tends to increase towards adolescence and the effect of parenting skills decreases as offenders grow older (Holmbeck, Greenley, & Franks, 2003; Loeber et al., 2008; Sampson & Laub, 1997; Stouthamer-Loeber et al., 1993; Van der Laan & Blom, 2006; Weijters, Vinke, Van der Logt, & Gerris, 2004). In early adolescence, family related risk factors are most strongly associated with recidivism whereas risk factors in the attitude, peer relationships and school domain are most strongly related to recidivism in late adolescence (Van der Put et al., 2010; Van der Put et al., 2012). Because little is known about age differences in the relationship between dynamic risk factors and recidivism in adult offender populations, the aim of the current study was to provide more insight in the severity, impact, and relative importance of dynamic risk factors for recidivism at different ages, ranging from late adolescence to late adulthood.

1.3. Theories on change in the severity, impact and relative importance of risk factors

Moffitt's dual taxonomy theory (1993) distinguishes between 'adolescence-limited' and 'life-course-persistent' offenders. The adolescence-limited offender exhibits antisocial behavior only during adolescence, and desists from crime after adolescence (Sampson & Laub, 2005; Farrington, 2003). Considering the high prevalence of antisocial behavior during adolescence, delinquency could be regarded as more or less normative behavior in adolescence. Adolescence-limited antisocial behavior is not so much caused by exposure to risk factors, and therefore, adolescence-limited antisocial behavior can hardly be predicted by the severity of risk factors. Life-course-persistent antisocial behavior starts at an early age and continues into adulthood. Life-course-persistent antisocial behavior is thought to be explained by individual factors (for example, psychopathic traits) that are subsequently reinforced by a high-risk environment (Fox, Jennings, & Farrington, 2015; Moffitt, 1993; Stouthamer-Loeber, Loeber, Wei, Farrington, & Wikström, 2002). It is expected that the relation between recidivism and dynamic risk factors will therefore be stronger in this group, and the prediction of life-course-persistent antisocial behavior based on risk factors is thus considered to be more accurate.

From childhood to adolescence, the proportion of adolescence-limited offenders increases towards a peak around 17 years old, and as juveniles get older, the proportion of adolescence limited offenders decreases. The number of life-course-persistent offenders remains relatively stable over age groups (Moffitt, 1993). Consequently, it is expected that the impact of dynamic risk factors in predicting recidivism will decrease from childhood to adolescence, and then increases from adolescence to adulthood. Over the course of life, the impact of dynamic risk factors for recidivism is expected to follow a U-shaped curve, with the bottom at 17 years old.

Previous studies have shown that the relative importance of dynamic risk factors for recidivism changes over the course of life (Spanjaard et al., 2012; Van der Put et al., 2010; Van der Put et al., 2012). This finding may be explained by principles from the developmental criminology. Each developmental stage is characterized by specific developmental tasks that need to be faced in order to successfully transit to the next developmental stage. For example, building safe attachment relations with caregivers is an important developmental task in early childhood. Gaining autonomy from parents, building prosocial friendships, and experiencing academic success is central in adolescence (Oudekerk, Allen, Hessel, & Molloy, 2015; Roisman, Masten, Coatsworth, & Tellegen, 2004). Further, whether a young adult is able to attain job and marriage stability, is predictive of their criminal behavior (Blokland & Nieuwbeerta, 2005; Sampson & Laub, 2005). These transitions, or "turning points" are influencing the chances of the emergence of or the desistance from crime (Sampson & Laub, 2005; Sampson, Laub, & Wimer, 2006). Because developmental themes vary over the course of life, the impact of these themes on recidivism could also change.

1.4. The current study

Taking the "developmental model of onset, accumulation, and continuity of risk factors" of Loeber et al. (2008), Moffitt's (1993) dual taxonomy theory, and theories on developmental criminology (Sampson & Laub, 2005) together, several implications with regard to the severity, impact, and relative importance of dynamic risk factors for recidivism are hypothesized for adult offender populations. First, we assume, in line with the "developmental model of onset, accumulation, and continuity of risk factors" of Loeber et al. (2008), that the severity of dynamic risk factors for recidivism declines with age. Second, based on Moffit's dual taxonomy theory (1993), it is hypothesized that a U-shaped curve of the impact of dynamic risk factors for recidivism can be expected, with – in general – bottoms out around the age of 17 years. Therefore, we assume that the impact of dynamic risk factors increases with age in adult offender populations.

Additionally, theories from developmental criminology (Farrington, 2003; Moffitt, 1993; Sampson & Laub, 2005) could imply change in the relative importance of dynamic risk factors over the course of life. We expect during adolescence and early adulthood the peer, and education and work domains become strong predictors of recidivism, whereas in middle and late adulthood the individual risk factors again become most important predictors of recidivism.

Ideally, abovementioned hypotheses should be tested in samples in which young offenders are being followed throughout life.

Unfortunately, such samples are not easy to come by. Therefore, in order to submit the implications of the existing criminological theories to some first empirical tests, it is valuable to see whether there are age differences in the severity, impact, and relative importance of dynamic risk factors for recidivism. This has been tested previously in juvenile and young adult samples (Spanjaard et al., 2012; Van der Put et al., 2010; Van der Put et al., 2012). The present study examined the severity, impact, and relative importance of dynamic risk factors in predicting recidivism in adult offenders. To summarize, this study focused on the following research questions: (1) Are there differences between adult offender age groups in the severity of dynamic risk factors in the various domains? (2) Are there differences between these age groups in the strength of the relationship between dynamic risk factors and recidivism? (3) Are there differences between the age groups in the relative importance of dynamic risk factors?

2. Method

2.1. Sample

The sample consisted of 8665 adult offenders, 7815 (90.2%) men and 849 (9.8%) women, with a mean age of $M = 34.33$ years ($SD = 11.91$), ranging from 18 to 86 years. We included both men and women in the sample, because a previous study did not find important gender differences in the impact of dynamic risk factors for recidivism (Van der Knaap, Alberda, Oosterveld, & Born, 2012). All offenders had been referred to probations services by court. For the present study, data from the Dutch probation services were used that had been collected between January 2010 and December 2011. The offenders were referred to the probation services for violent offenses (51.0%), property offenses without violence (22.1%), property offenses with violence (6.8%), drug offenses (9.0%), sex offenses (6.2%), traffic offenses (1.4%), or other offenses (3.4%). The mean number of previous offenses was 9.70.

For this study, we divided the total sample in the following four age groups[1]: (1) age 18 to 25: $n = 2731$ (31.5%), referred to as the late adolescence group; (2) age 26 to 30: $n = 1270$ (14.6%), referred to as the early adulthood group; (3) age 31–40: $n = 2155$ (24.9%), referred to as the middle adulthood group; and (4) age 41 years and older: $n = 2509$ (29%), referred to as the late adulthood group.

Table 1 presents the demographic and recidivism features of the different age groups of the sample. Chi-square tests were used to assess age group differences for demographic and recidivism features, reporting Cramér's V as a measure of effect size. For gender, a significant difference was found for the 41 + age group. The proportion of men was significantly lower in this age group then in the other age groups. Native Dutch origin is relatively more common in the age group 18–25, compared to the other age groups, and non-western origin is relatively more common in the 31–40 age group, compared to the other age groups. Furthermore, the offenders between 18 and 25 years of age were more likely to reoffend (57.3%) than the other groups, whereas offenders of 41 years and older were less likely to reoffend (36.3%). However it must be noted that all differences had small effect sizes (Cohen, 1988).

[1] "In the age range of 18–25, a lot of changes take place in life. It is the transition phase from adolescence to adulthood, and in this period a lot of adolescents become independent by moving out of the parent's home. Further, this period is characterized by change in school setting (e.g., from high school to college) or the start of the first job. In the age range of 26–30, still a rather large amount of changes take place. Most young adults are working, but they change relatively rapidly between jobs. Often in this phase, the first serious relationship occurs. In the period 31–40years old, adults are generally settling and focused on expansion of the family. After the age of 41, most lives are quite stable and there are fewer changes among the different life domains."

2.2. Measures

2.2.1. Risk and needs assessment

The Recidivism Risk Assessment Scales (RISc; Adviesbureau Van Montfoort and Reclassering Nederland, 2004) is used by the Dutch probation services to assess the offenders' risk and needs. Probation services in the Netherlands use the RISc to assess the risk and needs of offenders for intervention and rehabilitation plans and to advise the prosecutor and the court. The RISc is based on the Offender Assessment System (OASys; Howard, Clark, & Garnham, 2003; Howard, Clark, & Garnham, 2006) which is used as a system for diagnose, needs assessment and planning sanctions. The RISc shows considerable similarities to the LSI-R, because the OASys is based on the LSI-R (Hollin & Palmer, 2006). Following the RNR principles (a model of risk, need and responsivity) the RISc maps out statistic and dynamic risk factors of the offender and its social environment (Adviesbureau Van Montfoort and Reclassering Nederland, 2004). Based on these RNR principles, the RISc was constructed to achieve the following purposes: a) to determine the offenders' likelihood of recidivism; b) to map out the offending-related needs; c) to assess the offenders' responsivity, and finally; d) to make an indication of the need for further specialist assessment. To identify present dynamic risk factors, we used the following scales of the RISc: 1) accommodation; 2) education and work; 3) financial management and income; 4) relationships with partner, family and relatives; 5) relationships with friends and acquaintances; 6) drug misuse; 7) alcohol misuse; 8) emotional wellbeing; 9) thinking and behavior, and; 10) attitude and orientation (see Appendix A for sample items). The RISc consists of 61 items with a varying number of items per scale. Most items must be scored on a 3-point Likert scale with 0 (no problems), 1 (some problems) and 2 (significant problems).

The RISc must be conducted by trained probation officers and assessment of this instrument takes about 4 to 5 h. Within this time, the probation officer reads information available about the offender, interviews the offender about the remaining subjects on which no file information is available and finally fills in the RISc. Previous research to inter-rater reliability, internal consistency, construct validity, and predictive validity shows positive results (Van der Knaap & Alberda, 2009; Van der Knaap, Leenarts, & Nijssen, 2007).

2.2.2. Recidivism

Recidivism was defined as the occurrence of any new conviction within a 3.5-year follow up period. Recidivism was coded as 0 (*no*) or 1 (*yes*). Recidivism data was obtained from a national government database with recorded conviction information. The data used in this study was retrieved completely anonymous because the information about the individual offenders was related to unique codes and could therefore not be linked to identifiable offender information. Only probation services have the information to link the unique codes to the individual offenders.

2.3. Statistical analysis

First, to examine differences in the severity of risk factors for the different age groups, ANOVAs on RISc domain scores, adjusted for gender and origin, were conducted. Second, to examine differences in the impact of risk factors for the different age groups, partial correlations, adjusted for gender and origin, of RISc domain scores and recidivism were calculated for each age group. To examine the significance of age group differences in the correlations, correlation coefficients were transformed into Fisher z values. The difference in Fisher z values was tested using z test statistics. Third, area under the receiver-operating-characteristic curve (AUC) values was computed to examine the strength of the associations between the total RISc score and recidivism, because AUC values are not sensitive to base rate differences. Fourth, the relative importance of the risk factors for each age group was assessed. Multivariate associations were analyzed

Table 1
Demographic and recidivism features of offenders in different age categories.

Variable	Age 18–25		Age 26–30		Age 31–40		Age 41 +				
	n	%	*n*	%	*n*	%	*n*	%	X^2	*p*	*V*
Gender									21.32	< 0.01	0.05
Male	2505	91.8a	1160	91.3a	1938	89.9a	2212	88.2b			
Female	225	8.2a	110	8.7a	217	10.1a	297	11.8b			
Origin									138.28	< 0.01	0.09
Native Dutch	2179	79.9a	907	71.4b	1404	65.2c	1773	70.8b			
Non-Western	469	17.2a	317	25.0b	634	29.5c	616	24.6b			
Western	79	2.9a	46	3.6b	114	5.3c	117	4.7b,c			
Recidivism									245.30	< 0.01	0.17
Yes	1564	57.3a	669	52.7b	1081	50.2b	910	36.3c			
No	1167	42.7a	601	47.3b	1074	49.8b	1599	63.7c			

	n	*M*	*n*	*M*	*n*	*M*	*n*	*M*	*F*	*p*
Number of prior offenses	2731	4.48a	1270	8.00b	2155	11.93c	2509	14.34d	183.058	< 0.01

Note. Percentage with the same subscript letter does not differ significantly from each other at the 0.05 level.

between the RISc domains and recidivism to examine the unique contribution of the RISc domains for each age group. Because the dependent variable (recidivism) was categorical, logistic regression analyses were used. Logistic regression can be used to examine the relation between a categorical dependent variable and one or more predictor variables.

3. Results

3.1. Differences in severity of dynamic risk factors across the age groups

Age differences were examined in the RISc domain scores. Table 2 shows the mean scores and standard deviations of the RISc sections in the separate age groups. The *F* values in this table show that there are significant age differences for each RISc domain score, indicating the prevalence of dynamic risk factors varies across age groups. For the problems with accommodation, financial management and income, relationship to partner and family, drug misuse, alcohol misuse, emotional well-being, and attitude and orientation, an increase in problems was shown from late adolescence (18–25 years old) to early adulthood (26–30 years old), and a decrease in problems from middle adulthood (31–40 years old) to the oldest age group (41 + years old). Problems with education, work, and training and thinking and behavior were stable from late adolescence to middle adulthood and were significantly lower in the oldest age group. A gradual decrease over the age groups was found in the risk domain relationship with friends and acquaintances.

3.2. Differences in impact of dynamic risk factors across the age groups

The second aim of this study was to examine differences between different age groups considering the predictive validity of different dynamic risk factors in predicting general recidivism. Table 3 shows the partial correlation coefficients between the RISc domains and recidivism per age group, adjusted for gender and ethnicity. Each RISc domain correlated positively with recidivism and all correlations were significant. The AUC values of the total RISc score were 0.658 (95% *CI* = 0.638–0.679) for the 18–25 group, 0.687 (95% *CI* = 0.658–0.726) for the 26–30 group, 0.718 (95% *CI* = 0.697–0.740) for the 31–40 group, and 0.727 (95% *CI* = 0.707–0.748) for the 41 + group. Fig. 1 depicts the correlations between the risk domains and recidivism in a graph. This figure shows that, in general, there is an increase in the strength of the relation between risk domains and recidivism with increasing age until the age of 40 years.

To examine whether the differences between the age groups in the strength of the correlations between RISc domains and recidivism were significant, z tests on Fisher z scores were performed (see Table 4). Overall, the correlations between the dynamic risk factors and recidivism tended to increase with age. Most significant differences were found when comparing the 18–25 group with the 31–40 group and the 41 + group. Drug misuse and problems in the relationship with friends and acquaintances were stronger related to recidivism in the 26–30 age group than in the 18–25 group. Problems with accommodation, education/work, financial management/income, relationship with

Table 2
A comparison of risk and needs between different age groups.

	Age 18–25 (*n* = 2731)	Age 26–30 (*n* = 1270)	Age 31–40 (*n* = 2155)	Age 41 + (*n* = 2509)	
RISc section	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*F*†
Accommodation	0.34 (0.49)a	0.45 (0.60)b	0.47 (0.61)b	0.39 (0.56)c	20.651***
Education, work and training	0.75 (0.56)a	0.79 (0.56)a	0.76 (0.57)a	0.64 (0.57)b	27.562***
Financial management and income	0.55 (0.55)a	0.71 (0.58)b	0.70 (0.59)b	0.54 (0.55)a	49.811***
Relationship with partner, family and relatives	0.71 (0.54)a	0.82 (0.53)b	0.84 (0.53)b	0.75 (0.50)c	31.562***
Relationship with friends and acquaintances	0.70 (0.52)a	0.61 (0.52)b	0.54 (0.52)c	0.38 (0.45)d	181.574***
Drug misuse	0.51 (0.49)a	0.63 (0.55)b	0.60 (0.58)b	0.39 (0.53)c	72.831***
Alcohol misuse	0.39 (0.54)a	0.48 (0.60)b	0.55 (0.64)c	0.48 (0.61)bc	43.318***
Emotional well-being	0.64 (0.49)a	0.72 (0.53)b	0.77 (0.58)c	0.74 (0.56)bc	34.796***
Thinking and behavior	0.93 (0.47)a	0.95 (0.49)a	0.94 (0.50)a	0.87 (0.48)b	12.830***
Attitude and orientation	0.70 (0.53)ab	0.73 (0.55)b	0.72 (0.54)b	0.68 (0.53)a	2.810*

Notes. Values with the same subscript do not differ significantly from the other age groups. † The ANOVA analyses are corrected for gender and origin.
* $p < 0.05$.
*** $p < 0.001$.

Table 3
Partial correlations between RISc scales and recidivism for each age group.

	Age 18–25 (n = 2731)	Age 26–30 (n = 1270)	Age 31–40 (n = 2155)	Age 41 + (n = 2509)
Accommodation	0.144**	0.182**	0.231**	0.254**
Education, work and training	0.233**	0.257**	0.296**	0.270**
Financial management and income	0.171**	0.190**	0.256**	0.264**
Relationship with partner, family and relatives	0.144**	0.100**	0.136*	0.163**
Relationship with friends and acquaintances	0.214**	0.280**	0.309**	0.280**
Drug misuse	0.143**	0.264**	0.330**	0.317**
Alcohol misuse	0.137**	0.187**	0.208**	0.251**
Emotional well-being	0.110**	0.089**	0.127**	0.142**
Thinking and behavior	0.223**	0.229**	0.272**	0.264**
Attitude and orientation	0.219**	0.212**	0.238**	0.199**
Total score of dynamic RISc scales	0.267**	0.306**	0.361**	0.377**

Notes. The partial correlations are corrected for gender and origin.
* $p < 0.05$.
** $p < 0.01$.

friends or acquaintances, drugs misuse, and alcohol misuse all showed a significantly stronger relation to recidivism in the 31–40 age group than in the 18–25 age group. Furthermore, problems with accommodation, financial management/income, relationship with friends or acquaintances, drugs misuse, and alcohol misuse were significantly stronger related to recidivism in the 41 + group than in the 18–25 group. In addition, drug misuse and problems with financial management/income were stronger related to recidivism in the 31–40-year olds than in the 26–30-year olds. Problems with accommodation, financial problems, and alcohol misuse were stronger related to recidivism in the 41 + age group than in the 26–30 age group.

3.3. Relative importance of dynamic risk factors for each age group

Multivariate associations between risk factors and recidivism were analyzed in order to examine the unique contribution of the risk factors, while controlling for the effect of other risks factors and gender and origin. By doing so, we can gain insights into the importance of the risk factors, relatively to each other. Because the dependent variable (recidivism) was categorical, we used logistic regression analyses for each age group. The logistic regression coefficients representing the associations between the risk factors and recidivism for each age group are shown in Table 5.

Age differences in the unique contributors to recidivism were found. In the age group 18–25, education/work, alcohol misuse, relationship with friends and acquaintances, attitude and orientation, and emotional well-being (in order of strength, from high to low) were uniquely related to recidivism. For emotional well-being, a reversed effect was found, indicating that more problems in emotional well-being were predictive of less recidivism. In the age group 26–30, drug misuse, relationship with friends and acquaintances, education, work and training, alcohol misuse, and emotional well-being were uniquely related to recidivism. Again, for emotional problems, this was a reversed effect. In the 31–40 age group, drug misuse, relationship with friends and acquaintances, education work and training, emotional well-being, and alcohol misuse were uniquely related to recidivism. For emotional well-being was this effect reversed. Finally, in the age group 41 +, drug misuse, alcohol misuse, thinking and behavior, relationship with friends and acquaintances, financial management and income, and education, work, and training were uniquely related to recidivism.

4. Discussion

The current study aimed to examine age differences in the severity, impact, and relative importance of dynamic risk factors for recidivism in an adult offender population. The sample consisted of N = 8.665 adult offenders, and was divided in four age groups (18–25, 26–30, 31–40, and 41 + years old). First, we found that the severity of dynamic

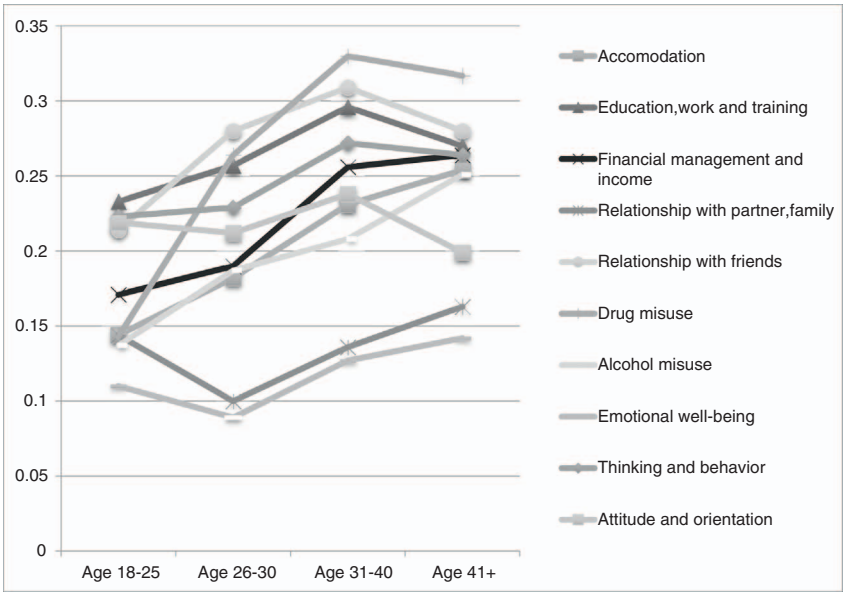

Fig. 1. Strength of the relation between dynamic RISc scales and recidivism for each age group.

Table 4
Fisher's z values of the compared age groups.

Differences between age groups	18–25 and 26–30	18–25 and 31–40	18–25 and 41 +	26–30 and 31–40	26–30 and 41 +	31–40 and 41 +
Accommodation	1.15	3.13**	4.14***	1.45	2.19*	0.83
Education, work and training	0.75	2.35*	1.43	1.19	0.41	− 0.96
Financial management and income	0.57	3.03**	3.46***	1.96*	2.26*	0.29
Relationship with partner, family and relatives	− 1.31	− 0.28	0.70	1.03	1.86 +	0.94
Relationship with friends and acquaintances	2.07*	3.54***	2.54*	0.90	0	− 1.08
Drug misuse	3.72***	6.90***	6.66***	2.05*	1.68	− 0.49
Alcohol misuse	1.15	2.54*	4.29***	0.62	1.95*	1.54
Emotional well-being	− 0.62	0.60	1.18	1.09	1.56	0.52
Thinking and behavior	0.19	1.81 +	1.58	1.30	1.08	− 0.29
Attitude and orientation	− 0.22	0.70	− 0.76	0.77	− 0.39	− 1.39
Total score of dynamic RISc scales	1.25	3.61***	4.43***	1.74+	2.33*	0.63

+ $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

risk factors varied across the four age groups. For most risk domains, the severity of risk factors generally increased with the increasing age and decreased again after middle adulthood (31–40 years old). According to Loeber et al. (2008) "developmental model of onset, accumulation, and continuity of risk factors", the severity of risk factors increases as children grow older, peaks during adolescence and then decreases in early adulthood. In the current study, we did find that the severity of dynamic risk factors varied across the age groups. However, only a clear decreasing severity of problems with friends and acquaintances over the course of adulthood was found. The discrepancy between Loeber and colleagues' theory (2008) and our findings may be explained that our study was conducted in an offender population, focusing on recidivism, while the "developmental model of onset, accumulation, and continuity of risk factors" explains the severity risk factors of delinquent behavior in general and not recidivism per se.

Second, all of the dynamic risk factors were predictive of recidivism. Additionally, the dynamic risk factors were, in general, strongly related to recidivism in the older age groups (31–40 and 41 + age groups), compared to age groups in the early stages of adulthood (18–25 and 26–30 age groups). This finding indicates that the impact of dynamic risk factors on recidivism increases with age. During adolescence, the proportion of "adolescent-limited" offenders is relatively high compared to the proportion of "life-course persistent" offenders (Moffitt, 1993). Because adolescent limited offending behavior is presumed to be more difficult to predict by dynamic risk factors, it was expected that the impact of dynamic risk factors on recidivism is considerably lower in (especially late) adolescence compared to the impact of dynamic risk factors in childhood and adulthood. We expected that the impact of dynamic risk factors follows a U-shaped curve over the course of life. The current study has now showed the expected continuation of the increase of the impact of dynamic risk factors from adolescence to late adulthood.

Finally, we found age differences in the unique predictive value of dynamic risk factors for recidivism, that is, the effect of individual risk factors while controlling for the effect of other risk factors. This offers insights into the importance of the risk factors, relative to each other. For all age groups, problems with education/work, relationships friends and acquaintances, and alcohol misuse provided a unique contribution to the prediction of recidivism. For emotional well-being it was found that when controlling for the effect of other risk factors, more problems in emotional well-being were predictive of less recidivism in all age groups. Additionally, in the age group 18–25 years old, problems in attitude and orientation were uniquely associated to recidivism. For the age group 26–31 years old, problems with drugs use had a unique contribution to the prediction of recidivism. Problems with drug misuse were also uniquely associated to recidivism in the age group

Table 5
Multivariate associations between risk factors and recidivism for each age group

	Age 18–25 (n = 2731)				Age 26–30 (n = 1270)				Age 31–40 (n = 2155)				Age 41 + (n = 2509)			
	B	SE	Wald	Exp (B)	B	SE	Wald	Exp (B)	B	SE	Wald	Exp (B)	B	SE	Wald	Exp (B)
Accommodation	0.07	0.11	0.44	1.07	0.13	0.13	0.88	1.13	0.12	0.10	1.42	1.13	0.14	0.10	1.99	1.15
Education, work and training	0.48	0.10	21.70***	1.62	0.43	0.15	8.26**	1.54	0.37	0.12	10.13**	1.44	0.21	0.10	4.08*	1.23
Financial management and income	0.13	0.10	1.79	1.14	− 0.03	0.14	0.04	0.97	0.19	0.10	3.23	1.20	0.26	0.10	6.29*	1.29
Relationship with partner, family and relatives	0.18	0.09	3.65	1.20	− 0.09	0.13	0.40	0.92	0.01	0.10	0.02	0.99	0.15	0.10	2.29	1.17
Relationship with friends and acquaintances	0.35	0.10	12.19***	1.43	0.55	0.16	12.28***	1.73	0.45	0.12	13.16***	1.57	0.35	0.13	6.99**	1.42
Drug misuse	− 0.01	0.10	0.01	0.99	0.55	0.14	16.07***	1.74	0.65	0.11	35.14***	1.92	0.68	0.10	41.71***	1.98
Alcohol misuse	0.37	0.09	18.75***	1.45	0.41	0.11	13.67***	1.50	0.33	0.08	15.52***	1.39	0.52	0.08	46.03***	1.68
Emotional well-being	− 0.27	0.11	5.80*	0.77	− 0.43	0.15	7.97**	0.65	− 0.36	0.11	11.56**	0.70	− 0.16	0.10	2.50	0.86
Thinking and behavior	0.08	0.15	0.28	1.09	0.21	0.23	0.85	1.23	0.24	0.17	1.97	1.27	0.38	0.16	5.48*	1.46
Attitude and orientation	0.39	0.11	11.90**	1.48	0.14	0.17	0.71	1.15	0.14	0.13	1.09	1.14	0.01	0.12	0.01	1.01
Gender	0.93	0.16	33.16***	2.53	0.76	0.25	9.53**	2.14	0.10	0.17	0.36	1.11	− 0.01	0.15	0.00	1.00
Origin	0.06	0.11	0.34	1.06	0.08	0.14	0.31	1.08	− 0.13	0.10	1.62	0.88	− 0.01	0.11	0.01	0.99
Constant	− 1.68	0.18	85.52***	0.19	− 1.76	0.28	40.12***	0.17	− 1.33	0.20	43.92***	0.26	− 1.96	0.18	117.90***	0.14
$\chi(12)$	302.35***				197.86***				377.94***				432.75***			

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

31–40 years old and in the 41 + age group. Additionally, in the age group 41 +, problems with financial management/income, and thinking and behavior contributed uniquely to the prediction of recidivism. Across the age groups, dynamic risk factors for recidivism in the education/work domain became relatively less important with increasing age, the relative importance of risk factors in the peer and family domain stayed somewhat stable, and the relative importance of risk factors in the individual domain tended to increase with age, especially problems with alcohol and drug use. Thus, we found that the relative importance of dynamic risk factors also changes over the course of adulthood, which can be explained by change in the developmental themes across life phases (Sampson & Laub, 2005; Sampson et al., 2006).

It is interesting to note that in the oldest age group, the mean RISc scores (i.e., severity of the dynamic risk scores for recidivism) are low in comparison with the other age groups, while the correlations between the RISc scores and recidivism (i.e., the impact of the dynamic risk scores) are relatively high. This suggests that older offenders are more likely to have their lives in order, but if they don't, this contributes more strongly to recidivism. Perhaps, it is more normative for younger offenders to struggle with housing, employment, relationships, and drug or alcohol use, explaining why these risk factors correlated weaker with recidivism than in the older groups even though these problems were more severe.

When assessing the relative importance of dynamic risk factors in the different age groups with a multivariate model, problems in emotional well-being were negatively related to recidivism when controlling for the effects of other risk factors for all age groups. This means that more problems in emotional well-being were associated with less recidivism. In the partial correlations (controlling only for gender and origin), problems in emotional well-being were positively associated to recidivism. This discrepancy could possibly be explained by the shared variance between problems in emotional well-being and other dynamic risk domains. For instance, compromised emotional well-being is associated with substance use, relational problems, work, and financial problems (Artazcoz, Benach, Borrell, & Cortes, 2004; Bonta et al., 1998; Fortune, Cottrell, & Fife, 2016; Grant et al., 2004). In the partial correlations (adjusted for gender and origin), this could have led to a small, but positive, association between emotional problems and recidivism. When controlling for the shared variance with other risk domains in the multivariate model, a negative relation between emotional problems and well-being was found. This is in line with previous studies that found that mental health problems (especially internalizing problems) and self-destructive behavior are inversely associated to recidivism (Bonta et al., 1998; Mulder, Brand, Bullens, & van Marle, 2011; Van der Knaap et al., 2012; Vermeiren, Schwab-Stone, Ruchkin, De Clippele, & Deboutte, 2002). Vermeiren et al. (2002) have mentioned that the apathy and lower energy levels associated to internalizing problems could explain the reduced recidivism in offenders with internalizing problems.

The current study has some limitations that need to be mentioned. First, the hypotheses were tested in a Dutch offender sample. This could raise the question whether the findings of the current study could be generated towards American samples. However, Van der Put et al. (2012) found in large samples of Dutch and American juvenile offenders that age differences in the impact and relative importance of risk factors were to a large extent similar for the Dutch and American sample. Therefore, it is not expected that results would be very different in an American sample. Second, the current study focused solely on the impact of dynamic risk factors, and did not take the impact of protective factors in consideration. A previous study on adolescent offenders showed that the impact of promotive factors on recidivism was significantly higher in younger than in older adolescents in almost every domain (Van der Put, Van der Laan, Stams, Deković, & Hoeve, 2011). In addition, previous studies have shown that protective factors could provide a buffer to the negative influences of risk factors (Lodewijks, de Ruiter, & Doreleijers, 2010; Ullrich & Coid, 2011). Therefore, it is interesting to assess if there are age differences in the influence of protective factors for recidivism in adult offender samples and how they interact with the effect of dynamic risk factors. Third, the current study assessed the effect of individual dynamic risk factors and did not consider interaction effects. This could limit a full understanding of the influence of dynamic risk factors on recidivism (Assink et al., 2015). For example, in the current study we found that in the 41 + age group, alcohol misuse was, relative to other risk factors, the most important predictor of recidivism. However, it is not unthinkable that there could be an interaction effect with the risk factor financial problems. Offenders with alcohol problems and financial problems could have an elevated risk of recidivism, compared to offenders with alcohol problems, but no financial problems. Future research could investigate these interaction effects. Fourth, in our study, we have defined recidivism in terms of judicial convictions, registered in official court records. This brings the risk of underestimating the true level of recidivism, especially for minor offenses. On the other hand, Breuk, Clauser, Stams, Slot, and Doreleijers (2007) showed the risk of underreported delinquency in self-reported recidivism. Both official and self-reported data have their limitations, which should be taken in consideration when interpreting the results of studies on recidivism. Finally, in the current study, we aimed to test implications of existing criminological theories with regard to change in the severity, impact, and relative importance of dynamic risk factors for recidivism across life. This study builds upon the findings of previous studies in juvenile and early adulthood samples (Van der Put et al., 2010; Van der Put et al., 2012; Spanjaard et al., 2012). Testing the implications of criminological theories in an adult sample provided some empirical evidence in favor of the assumptions in this study, but in order to establish the accuracy of the hypotheses, much more research (in large, longitudinal samples, including both juvenile and adult offenders) is necessary.

Despite the limitations, the current study yields a clear contribution to the understanding of recidivism, and offers implications for future research and offender therapy. First, we have tested assumptions on the severity, impact, and relative importance of dynamic risk factors on recidivism over the course of life. Future research should replicate the current study in other datasets, and test more specifically for which offender populations, and in which cultures, these assumptions hold. Additionally, future studies with longitudinal designs should examine how within-person change in dynamic risk factors in individual offenders during different life phases is related to recidivism (see for example Bindels et al., 2016).

Second, based on the findings from this study and from previous studies (Van der Put et al., 2010; Van der Put et al., 2012) we speculate that, in general, the effect of offender therapy on recidivism during late adolescence is expected to be modest compared to treatment in early adolescence or in adulthood. According to the RNR model, offender therapy should focus on criminogenic needs, that is, dynamic risk factors that have a clear functional relation with recidivism (Andrews & Bonta, 2010b). Consistent with previous studies (Van der Put et al., 2010; Van der Put et al., 2012), we found that in late adolescence, these dynamic risk factors were only weakly associated to recidivism. Therefore, treating adolescent offenders in order to reduce recidivism could generally have smaller effects compared to treatment in early adolescence or adulthood. For example, Van der Stouwe, Asscher, Stams, Deković, and Van der Laan (2014) have found in a meta-analytic review larger effect of Multi Systemic Therapy in early adolescence compared to middle/late adolescence. The recent meta-analytic review of Assink et al. (2015) showed that in life-course persistent offending juveniles, risk factors in multiple risk domains were more prevalent than in adolescence-limited offending juveniles, with the strongest effects for criminal history, aggressive behavior, alcohol/drug abuse. All and all, this implies that offender treatment should focus on adolescence offenders with more severe problems on multiple

domains, offenders who started in childhood or early adolescence, and adult offenders.

Third, the current study found age differences in the relative importance of dynamic risk factors. In late adolescence (18–25 years old), recidivism was most strongly predicted by problems in the education, alcohol use, attitude and orientation, and friends domain, while in the 41 + age group, recidivism was most strongly predicted by alcohol and drug misuse. This implies that recidivism in late adolescent offenders is predicted by a broad spectrum of risk domains, and treatment of late adolescent offenders should focus on multiple risk domains (Assink et al., 2015). For adult offenders (26 years or older), recidivism was also predicted by multiple risk factors, but offenders with alcohol or drug problems clearly had the highest risk of reoffending. This suggests that in order to reduce recidivism in adult offenders, especially those with alcohol and drug problems should receive intensive treatment, which should be directed at substance abuse (Andrews & Bonta, 2010b).

Finally, the finding that there are age differences in the impact and relative importance of dynamic risk factors for recidivism could imply that it is valuable to test for measurement invariance across age groups in risk assessment. Possibly, it is appropriate to assign different weights to specific risk domains for younger and older adults. From a developmental perspective it makes sense that for older adults, problems with housing and finances weigh heavier than for young adults, which could lead to age dependent norms. However, it is important not to draw overly strong conclusions on the finding that there are age differences in the relative importance of dynamic risk factors for recidivism. The results show that for all age groups, problems with education/work, relationships friends and acquaintances, and alcohol misuse provided a unique contribution to the prediction of recidivism. This means that even though some risk factors are more important in certain age groups, in general, these risk factors are informative for all age groups.

5. Conclusions

Altogether, the current study showed that there are age differences in the severity, impact, and relative importance of dynamic risk factors for recidivism in adult offenders. Most important is the finding that the impact of dynamic risk factors for recidivism increased in older age groups, suggesting that the potential treatment effects targeting these dynamic risk factors increases during adulthood (Andrews & Bonta, 2010b). Additionally, we found that the relative importance of the dynamic risk factors for recidivism differed across age groups. These findings can be placed in the theoretical framework of existing criminological theories, such as the developmental model of Loeber et al. (2008), the dual taxonomy theory of Moffitt (1993), and developmental criminological perspectives (Sampson & Laub, 2005). The findings of the current study could have considerable implications for assessment, offender therapy and practice. Future research should assess if the proposed hypotheses on the severity, impact, and relative importance of dynamic risk factors for recidivism across the life span can be supported in other offender samples.

Appendix A

Subscale	Sample item	Response options
Accommodation	Accommodation track record (have there been periods of homelessness)	0 = no, 1 = some experience with homelessness, 2 ≥ 6 months of homelessness
	Quality of the living environment	0 = living environment does not contribute to criminal behavior, 1 = living environment contributes somewhat to criminal behavior, 2 = lives in criminal neighborhood/close to victims
Education, work and training	Work experience and employment track record	0 = employed and does not quit job before a new job is found, 1 = usually has a job but quits before a new job is found, 2 = not employed, unclear employment track record
	Attitude towards education, work or training	0 = motivated, 1 = somewhat motivated, 2 = not motivated
Financial management and income	Current financial situation	0 = stable and appropriate, 1 = not always stable and appropriate, 2 = no insight in financial situation
	Gambling addiction or other addiction	0 = no, 2 = yes
Relationship with partner, family and relatives	Quality of current relationship with partner, family, and other relatives	0 = mutual relationships, 1 = problems with relationships, 2 = destructive, harmful relationships
	Family member has police record	0 = no, 2 = yes
Relationship with friends and acquaintances	Friends and acquaintances	0 = reject criminal behavior, 1 = have a role in criminal behavior, 2 = mostly criminal friends
	Negative influence of friends	0 = no, 1 = is being used by friends, 2 = totally dependent on friends
Drug misuse	The offender's criminal behavior and his or her drug use are linked	0 = no, 1 = connections with criminal behavior, 2 = connections with criminal behavior and violence
	Drug use	0 = no, 1 = yes
Alcohol misuse	Current alcohol use is problematic	0 = does not drink, 1 = drinking has some influence, 2 = problematic drinker
	The offender's criminal behavior and his or her alcohol use are linked	0 = no, 1 = connections with criminal behavior, 2 = connections with criminal behavior and violence
Emotional well-being	Self-destructive behavior	0 = no, 2 = current or past self-destructive behavior
	Mental problems	0 = no, 1 = no link with criminal behavior, 2 = long term mental health problems
Thinking and behavior	Impulsivity	0 = not impulsive, 1 = somewhat impulsive, 2 = very impulsive
	Social skills	0 = social competent, 1 = somewhat incompetent, 2 = very incompetent
Attitude and orientation	Pro-criminal attitudes	0 = accepts guilt, 1 = ambivalent feeling, 2 = feels that crimes pay off
	Motivation to change	0 = motivated, 1 = somewhat motivated, 2 = not motivated

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