Rule-breaking, crime, and entrepreneurship: A replication and extension study with 37-year longitudinal data

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Forthcoming in
Journal of Vocational Behavior
DOI: 10.1016/j.jvb.2013.06.007

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Abstract

Is there an intimate biographical relationship between entrepreneurship and antisocial tendencies? Drawing from Zhang and Arvey’s retrospective study [Zhang, Z., & Arvey, R. D. (2009). Rule breaking in adolescence and entrepreneurial status: An empirical investigation. Journal of Business Venturing, 24(5), 436-447], which found a link between entrepreneurship status of male adults and their recalled early antisocial rule-breaking behavior in adolescence, the present study utilized prospective longitudinal data from a Swedish cohort study to clarify the connection between antisocial rule-breaking, crime, and entrepreneurship by applying a developmental perspective. Regression results, which controlled for early socioeconomic background and intellectual competencies, indeed identified early antisocial rule-breaking behavior in adolescence as a valid positive predictor of a subsequent entrepreneurial career in adulthood in men (but not in women). In contrast, registered crime (teenage crime, adult crime, and prototypical trajectories of criminal behavior) as well as rule-breaking attitude in adolescence, as a more latent form of early antisocial tendencies, were relatively unimportant in the prediction of entrepreneurship in both genders. The results are discussed with a focus on rule-breaking and agency theories of entrepreneurship, youth theories, and the importance of looking at gender differences in entrepreneurial development.

Keywords: Entrepreneurship; Crime; Rule-Breaking; Entrepreneurial Development; Adolescence
Acknowledgments

This study was supported by the PATHWAYS International Postdoctoral Fellowship Programme for the Comparative Study of Productive Youth Development (Jacobs Foundation) and the Center for Applied Developmental Science (CADS) of the Friedrich-Schiller-University of Jena, Germany. The authors thank Lars Bergman and Per Davidsson for helpful comments.
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The mug shot, taken by the Albuquerque Police Department in 1977, shows a young man, virtually still a teenager, with tinted eyeglasses and an intelligent smile. More a nice nerdy guy than a “criminal scallywag”, one might think when inspecting the picture. Indeed, the portrait shows none other than Bill Gates, co-founder of Microsoft and one of the most famous entrepreneurs of our time (http://www.mugshots.org/misc/bill-gates.html). He earned worldwide respect for his key role in the personal computer revolution. Today, he is further known for his philanthropist activities (e.g., donating a great share of his wealth to charity). Back in 1977, he had been arrested for a traffic violation, according to media reports (reportedly not the only arrest in his younger years). The existence of such a mug shot might come as a surprise for many people thinking of famous entrepreneurs as “shining” heroes and role models who make significant positive contributions to society (for example because they managed the risk of starting a new venture, introduced innovations, created new jobs, and contributed to social wealth; Solomon, 1996). For others, in turn, it may confirm a general stereotype of entrepreneurs as some sort of a homo economicus that first and foremost looks at their own personal advantages with the central motive of profit maximization, regardless of morality or social and ethical principles (Anderson & Smith, 2007).

But is this Bill Gates example really typical for the “ordinary” entrepreneurial career (Dyer, 1994)? Is there indeed a systematic relationship between early antisocial tendencies that stand against society’s conventions (cf. Caspi, Elder, & Bem, 1987) and an entrepreneurial career that contributes to society (e.g., via job creation)? Are these two sides of the same coin in the biographies of many entrepreneurs? On the one side of the coin, there is this enterprising behavior in adulthood – demanding and complex activities (e.g., founding and managing a new business, creating new jobs, and introducing innovations) that require
the successful management of risks and diverse resources (e.g., financial, human, and technological resources), and that many economists and policymakers praise as important drivers of economic and technological development, job creation, and social wealth in our globalized societies (Audretsch, 2007; Hisrich, Langan-Fox, & Grant, 2007). Indeed, existing research often points to the prosocial side of entrepreneurship. In summarizing research on morality and ethics among entrepreneurs vs. non-entrepreneurs, Harris, Sapienza, and Bowie (2009) note that “some research indicates that entrepreneurs may indeed generally place a greater emphasis on ethical behaviors [e.g., fairness, procedural justice, and trust] … and exhibit higher levels of moral reasoning” when compared to non-entrepreneurs (p. 408; see the original work for an overview of studies). On the other side of the same coin, there might be some sort of a “dark side” among many entrepreneurs (Kets de Vries, 1985), in this case in the form of early maladaptation and early antisocial rule-breaking. This negative form of early unruliness might have been the seedbed of their entrepreneurial spirit in adulthood, as a more productive form of unruliness and rule-breaking (Schumpeter, 1934). At the same time, early antisocial unruliness could of course also lead to a number of negative developmental outcomes in adulthood such as persisting antisocial behavior or crime.

One should also keep in mind that the teenage years are in general associated with an increased prevalence of antisocial behaviors (e.g., Hirschi & Gottfredson, 1983; Sampson & Laub, 1992), a fact that developmentalists often explain by changes in the brain structure and functions (e.g., increased risk-taking and sensation seeking, Giedd, 2008; Steinberg, 2007), negative peer group effects, or the so-called maturity gap in adolescence, which motivates antisocial behavior by a misfit between biological and social maturity (Moffitt & Caspi, 2001). This does not mean though that antisocial behavior during the teenage years is normative (so that it cannot be, in principle, more typical for certain groups such as prospective entrepreneurs). Whereas the teenage years are often regarded as a period of
“storm and stress”, of rebellion and non-conformism to the adult world and societal norms, research has found the majority of teenagers to go through adolescence in a relatively unproblematic and prosocial fashion (Lerner & Steinberg, 2009). In other words, antisocial behaviors are more prevalent but far from being the norm in adolescence.

The possible relationship between developmental aspects of crime or antisocial rule-breaking and entrepreneurial status in adulthood has long remained untackled in empirical research. The few existing studies on crime and antisocial rule-breaking among entrepreneurs have mainly focused on a) specific subgroups such as entrepreneurial behavior among criminals (e.g., drug entrepreneurs, Zaitch, 2003), b) ethics and morality in entrepreneurship (Harris et al., 2009), and c) region-level relationships between crime and entrepreneurship rates (research that indicates that, at the regional level, entrepreneurship is associated with lower crime rates; e.g., Kreft & Sobel, 2005). Of course, like in (almost) every occupation, there should be “good” and “bad” entrepreneurs. For example, in his seminal theoretical article Baumol (1990) differentiated between productive, unproductive, and destructive entrepreneurship and assumed that an entrepreneurial spirit can find expression in very different ways including unproductive or destructive entrepreneurship (e.g., organized crime). In his view, it is mainly the reward structure of the economy and the set of prevailing rules that influence the manifestation of an entrepreneurial spirit into either productive or unproductive entrepreneurship. According to this view, an entrepreneurial spirit per se is not destructive or antisocial (but may have the potential for such negative expressions).

Such an emphasis on the context as something that has the potential to turn somebody into a “bad guy” is quite popular. In crime research, this is a well-known notion derived, for example, from the famous Stanford Prison Experiment and related studies (Haney, Banks, & Zimbardo, 1973; see also Zimbardo, 2007). It also figures prominently in today’s media landscape, for example in the award-winning TV series Breaking Bad, describing the
transformation of an ordinary high school chemistry teacher into a drug entrepreneur and murderer. However, research has also presented convincing evidence that crime is not purely dictated by the context. Recent research suggests that the psychological determinants of crime may be best understood by applying a biopsychosocial model of human development in context, a model that stresses the role of early developmental factors and trajectories of early maladaptation and antisocial behavior over the life course (Caspi et al., 2002; Laub & Sampson, 2003; Moffitt & Caspi, 2001; see also Andrews & Bonta, 2010).

Hence, the personal history matters, a notion that is not only a leading approach in psychological crime research but is also receiving growing attention in entrepreneurship research (for example in studies on early developmental precursors of an entrepreneurial career in adulthood; Obschonka & Silbereisen, 2012; Schmitt-Rodermund, 2004, 2007; Schoon & Duckworth, 2012). The question that is still on the table is whether many entrepreneurs from the normal population do indeed have a “dark past” in terms of crime and antisocial rule-breaking as a developmental precursor of an entrepreneurial career. This is a fascinating question because it not only concerns a possible “dark side” of entrepreneurs – an antisocial and even criminal personal history – but also combines crime and entrepreneurship research with a developmental career perspective (Vondracek, 2001).

Zhang and Arvey’s (2009) Study on Rule-Breaking in Adolescence and Entrepreneurship

There is one existing study, published in the Journal of Business Venturing, that already examined a possible connection between antisocial rule-breaking in adolescence and entrepreneurship in adulthood (Zhang & Arvey, 2009). In this study, the authors analyzed a sample of 165 men from the United States and tested whether recalled antisocial rule-breaking behavior in adolescence would predict entrepreneurship status in adulthood.

The authors hypothesized a positive relationship, thereby drawing upon Willis’ (1963) theory on nonconformity and related research (e.g., Anderson & Stoffer, 1979), which suggest
a connection between rule-breaking and central entrepreneurial characteristics such as independence, autonomy, creativity, and innovation. Zhang and Arvey argue that “the ability to question socially accepted norms and challenge the status quo is just what is needed to become a successful entrepreneur” and that “autonomy and independence underlying modest rule-breaking in adolescence can help the individual to form a habit of thinking ‘out of the box’ and behaving in an innovative way” (p. 440). This fits with Schumpeter’s (1934) classic definition of the entrepreneur, who seeks social distinction, thinks out of the box, has an inner drive to innovate, and is willing to break through traditional structures and to challenge the accepted way of doing things. Zhang and Arvey further refer to Gould (1969), who “believes that entrepreneurs are something close to juvenile delinquents” (p. 440). Following Kaplan (1980), they make a distinction between modest rule-breaking (e.g., taking part in group fights, deliberately damaging school property, accepting stolen merchandise, defying their parents’ authority to their face, or being placed on school probation or expelled) and severe rule breaking (e.g., being picked up by the police, driving a car when under the influence of alcohol or drugs, buying illegal drugs, or stealing a valuable item).

Zhang and Arvey’s (2009) results showed entrepreneurship status in adulthood (at age 37) to be positively predicted by recalled modest rule-breaking behavior in adolescence. Such an effect did not hold true for the recalled severe rule-breaking behavior in adolescence. Their study thus provides first empirical evidence suggesting that early antisocial tendencies are indeed associated with entrepreneurship.

However, Zhang and Arvey’s study also has major limitations that restrict the validity of their findings, as also stressed by the authors themselves. First, their study solely relies on self-reports with regard to antisocial tendencies. Second, and even more important, all information on early rule-breaking in adolescence refers to retrospective statements made in adulthood (at age 32). These statements are thus subject not only to a social desirability bias
Arguably, such biases could be particularly prevalent in the case of crime or rule-breaking data because such information refers to very private information that may disclose a dark personal past. Third, Zhang and Arvey’s study does not consider official crime records, which should be a valuable objective source for a study on antisocial tendencies. Fourth, and this is another major limitation, their study solely focused on entrepreneurs vs. managers when predicting entrepreneurial status (who becomes a manager vs. entrepreneur?). The results are thus restricted to these two groups. Fifth, their study did not consider antisocial tendencies in adulthood. The authors see this, however, as a “critical question” for entrepreneurship research, namely whether early antisocial tendencies among prospective entrepreneurs persist in adulthood “in terms of neglecting or bypassing social codes of ethical standards” (p. 444).

The Present Study

Inspired by Zhang and Arvey’s (2009) results, the present study was set up as a replication test and an extension of their study by making use of longitudinal data that covers childhood, adolescence, and adulthood and includes rich data on crime and antisocial rule-breaking. The data used in the present study stemmed from the Individual Development and Adaptation (IDA) study, a prospective study that followed the lives of a complete school grade cohort from a Swedish urban region well into middle adulthood (Bergman, 2000; Magnusson, 1988). Particularly important for the purpose of the present study, IDA is an established dataset in the research field on crime and antisocial rule-breaking (Bergman, Andershed, & Andershed, 2009; Mahoney, Stattin, & Magnusson, 2001; Stattin, Kerr, & Bergman, 2010; Stattin, Magnusson, & Reichel, 1989). IDA is representative of the Swedish population on registered crime (Stattin, Magnusson, & Reichel, 1989) and central findings in crime research have been replicated in the IDA data (e.g., Stattin et al., 2010 broadly replicated Moffitt’s famous typology of developmental trajectories of delinquent behavior and
underlying developmental pathways, Moffit & Caspi, 2001). Moreover, IDA has been widely used in research on a variety of other topics of human development such as longitudinal predictors of educational and occupational attainment (e.g., Andersson & Bergman, 2011; Huang & Sverke, 2007; Kokko, Bergman, & Pulkkinen, 2003). One can thus conclude that the IDA study lends itself as a suitable dataset to longitudinally investigate the research questions Zhang and Arvey (2009) raised and to clarify the connection between crime or antisocial rule-breaking and entrepreneurship from a developmental perspective.

The present study aimed at testing three research questions. The first refers to replication (Pashler & Wagenmakers, 2012) and asks whether Zhang and Arvey’s (2009) central finding, that recalled modest (but not severe) antisocial rule-breaking in adolescence predicts entrepreneurship in adulthood, can be replicated in a longitudinal study that examines a non-selected sample from the normal population and also considers crime data.

The second and third research questions then go beyond replication and test something new, as explained in the following. The second question makes a distinction between latent and manifest antisocial tendencies by looking at antisocial thinking vs. antisocial acting separately (Engels, Luijpers, Landsheer, & Meeus, 2004). The cognitive perspective, which does not primarily focus on behavior but rather on mental states and processes, has become a key approach in contemporary psychological entrepreneurship research (Hisrich, Langan-Fox, & Grant, 2007). Following the logic of Zhang and Arvey’s (2009) unruliness-hypothesis of entrepreneurial development, one developmental precursor of an entrepreneurial mindset in adulthood (Carsrud & Brännback, 2009) might be the early unruly mindset (which may not necessarily be manifested in juvenile antisocial behavior, for example due to a possible inhibiting effect of high social control in the proximal environment; Hirschi, 2002). Hence, a pure focus on behavioral aspects of antisocial rule-breaking might bring along the danger of overlooking a possible role of more latent forms of antisocial tendencies. For example, it
might be the case that prospective entrepreneurs differ from others in that they think and feel in antisocial ways in adolescence (and not so much in terms of actual antisocial behavior). Hence, a study interested in shedding light on a possible link between antisocial tendencies and entrepreneurship should look at both behavioral and non-behavioral aspects of antisocial tendencies. The present study thus not only tested whether prospective entrepreneurs would differ from non-entrepreneurs in terms of manifest antisocial behavior (i.e., early rule-breaking behavior, teenage/adult crime), but also considered a non-behavioral and more latent form of antisocial rule-breaking, namely antisocial attitudes in adolescence as an indicator of adolescents’ antisocial thinking (Butler, Leschied, & Fearon, 2007).

Third, while Zhang and Arvey’s (2009) study examined men only (male entrepreneurs vs. male managers), the present study focuses on entrepreneurial development among both men and women. Although crime is often described as a “male phenomenon”, it is an established tradition in developmental research on antisocial tendencies to consider both genders (e.g., Moffitt, Caspi, Rutter, & Silva, 2001). Moreover, entrepreneurship research has a strong interest in knowing more about the development of entrepreneurship not only in men but also in women (Kelley, Brush, Green, & Litovsky, 2011; Kourilsky & Walstad, 1998). The present study asked: Do results differ between the genders?

Method

Sample

This study is based on data from the longitudinal research program Individual Development and Adaptation (IDA; Bergman, 2000; Magnusson, 1988). In IDA, an entire school grade cohort of approximately 1,000 children in the medium-sized town of Örebro in Sweden were followed to adult age, starting in 1965 at age 10. Children who moved into the town after age 10 were added to the cohort. Bergman (1973) compared the IDA sample in Grade 6 with a fairly representative national sample with regard to a composite general
achievement test given in 1968 and 1969, and no significant difference was found. Throughout the program, the dropout rate has been very low (below 5% at school age in each data collection and 11% at age 43 for the women and 18% for the men at age 47; see Bergman, 2000; Trost & Bergman, 2004). In the present study, data from age 10, 13, 15, 16, and 43 (women) or 47 (men) were used (which sums up to an overall length of data collection of 37 years). In addition, data from official records were used to measure criminality.

**Variables**

*Teenage and adult crime.* Registered criminality was obtained from the records of the local police, social authorities, and child welfare authorities in all the police districts in which any one of the participants had lived up to his or her 35th birthday (Stattin, Kerr, & Bergman, 2010). Data were also collected from the National Police Board. Complete register data were secured for all participants except one (see Stattin & Magnusson, 1991). Only offences that led to some sort of societal sanction were counted (e.g., crimes against the Swedish Penal Code, the Swedish Road Traffic Offences Act, the Swedish Drug Offences Ordinance, or the Swedish Currency Ordinance). For children below the age of criminal responsibility, a crime was counted only if the child, after a hearing by the local police to determine guilt, was turned over to the child welfare authorities. Following Bergman and Andershed’s (2009) assessment of registered crime in adolescence and adulthood, we used dummy variables. *Teenage crime* was coded as 1 if the person had at least one recorded crime before age 18 (23.3% of the male sample) and 0 otherwise. Due to the very low prevalence of teenage crime in women (2.2%), this variable was not considered in the statistical analyses in women. *Adult crime* was coded 1 if the person had at least one recorded crime between age 18 and 35 (29.3% of the male sample; 8.7% of the female sample) and 0 otherwise.

*Rule-breaking behavior in adolescence.* Measures of rule-breaking behavior stemmed from the Norm Inventory (Magnusson, Dunér, Zetterblom, 1975; see also Stattin et al., 2010)
and were given at age 15. The measure comprised eight norm-breaking activities covering activities at home (ignoring parents’ prohibitions, staying out late without permission), at school (cheating in an exam, truanting), and during leisure time (smoking hashish, getting drunk, shoplifting, loitering in town in the evening). They reported how many times they had engaged in each norm-breaking behavior: ‘never’ (1), ‘once’ (2), ‘2–3 times’ (3), ‘4–10 times’ (4), and ‘more than 10 times’ (5). A mean score was created from the eight items (Cronbach’s $\alpha = .82$) (Men: $M = 2.03$, $SD = 0.70$; Women: $M = 1.86$, $SD = 0.71$).

*Rule-breaking attitude in adolescence.* Consistent with the rule-breaking behavior items, measures of rule-breaking attitudes were also taken from the Norm Inventory (Magnusson et al., 1975) and were also given at age 15. The measure comprised the adolescents’ attitudes toward the same eight norm-breaking activities as described above (how acceptable such antisocial behavior is in their view). The question was “What do you think about?” followed by the eight behaviors rated on a scale from 1 (Very stupid) to 7 (Perfectly acceptable). A mean score was created from the eight items (Cronbach’s $\alpha = .82$) (Men: $M = 2.63$, $SD = 0.91$; Women: $M = 2.59$, $SD = 0.91$). Consistent with prior research on delinquent attitudes (e.g., Engels, Luijpers, Landsheer, & Meeus, 2004), these rule-breaking attitudes were positively correlated with the actual antisocial behavior [with rule-breaking behavior in adolescence (Men: $r = .66$, $p < .001$; Women: $r = .73$, $p < .001$) and also with teenage crime (Men: $r = .21$, $p < .001$) and adult crime (Men: $r = .14$, $p < .001$; Women: $r = .13$, $p < .01$)].

*Entrepreneurship in adulthood.* Information about entrepreneurship was taken from an extensive interview conducted at age 43 for the women and age 47 for the men. One major aim of these extensive interviews was to collect in-depth data on the individual occupational career. The interview assessed the current work situation and also carefully reconstructed the person’s total working and educational career in intervals of at least six months (in other
words, only those jobs that lasted for at least six months were considered; for more details see Trost & Bergman, 2004 and Huang & Sverke, 2007). Two measures of entrepreneurship in adulthood were used in the present study.

First, to achieve a comparable measure of entrepreneurial activity as employed in Zhang and Arvey’s (2009) study (which focused on entrepreneurship status at a certain age), entrepreneurship status at age 43/47 was assessed. This variable indicates if the person at the time of the interview (when the men were 47 and the women 43) was currently running their own business (0 = employed, 1 = own business [Men: 21.4%; Women: 8.1%]).

However, such a measure is unlikely to reflect a person’s entrepreneurial activities over longer periods of their occupational career (for example, it may underestimate the prevalence of entrepreneurial activity over the career). In this vein, Davidsson (2007) stressed that “if we are to successfully explain or predict entrepreneurial action and success with (distal) variables on the individual level, then entrepreneurship has to be assessed broadly on the individual level, and preferably over longer periods of time” (p. 295). Likewise, Sarasvathy (2004) called for more entrepreneurship research that actually considers enterprising activities over a longer period of time to better understand the (development of the) enterprising individual. Following this line of thinking, the present study, in contrast to Zhang and Arvey’s (2009) analysis, also employed a second measure of entrepreneurship in adulthood: Entrepreneurship over the career. This variable was derived from the in-depth data on the individual occupational career collected in the age 43 (women) and age 47 (men) interviews, which reconstructed the total working career history in six-monthly intervals, as explained above (until the age of 43/47). The variable indicates if the person has been an entrepreneur (running their own business for at least six months) at least once over the course of their career in adulthood (vs. all others) (no = 0, yes = 1 [Men: 32.1%; Women: 10.1%]).
Control variables. To consider differences in the socioeconomic developmental background and in intellectual competencies, measures of parental socioeconomic status (SES), creativity, and intelligence were used as control variables in the analyses. The consideration of such factors is well established in both crime and career research (Schoon & Duckworth, 2012; Stattin et al., 2010; Ward, 2004; Wiesner, Capaldi, & Kim, 2010).

Parents’ SES was measured using a survey of parents undertaken when the children were 13 years old. The measure is a composite of the educational attainment of the parent with the highest education and family income (Andersson & Bergman, 2011). Educational attainment was measured by a seven-point scale ranging from 1 (Compulsory school) to 7 (University degree). Family income was measured on a seven-point scale indicating income intervals (1 indicated low income and 7 high income). If such data from age 13 were missing, data from age 10 (survey of parents) was used. The mean score of the two (z-standardized) items was computed (Men: $M = -0.06$, $SD = 1.76$; Women: $M = 0.07$, $SD = 1.86$).

Early creativity was measured by two scales assessing divergent thinking (Guilford, 1967) at age 13 and 16 (details are provided in Magnusson, Dunér, & Zetterblom, 1975). The first scale (age 13) is a verbal test (“Consequences test”) designed by Larsson and Sandgren (1968). The test contains five items of the type “What do you think would happen, what would be altered and what would follow if water could burn?”. The verbal fluency of the answers was scored (i.e., the number of replies given). Cronbach’s $\alpha$ is between .84 and .88 for girls/boys. The test is similar to Guilford’s (1967) Divergent Semantic Units. The second scale, measured at age 16, is the Titles Test, which is a Swedish version of the Plot Titles Test (Guilford, 1967). The task was to formulate titles to fit texts. The absolute number of fitting titles that were produced in a given time was scored. We combined the two scales (mean of the z-standardized scale scores) to achieve a trait-like, multi-method measure of early creativity in adolescence (Men: $M = -0.04$, $SD = 0.89$; Women: $M = -0.04$, $SD = 0.89$).
Intelligence was assessed in grade 6 (age 13). The study participants completed six written group tests (two verbal, two logical-inductive, and two spatial tests) from the Differential Intelligence Analysis battery (DIA, Härnquist 1961). Together these tests, which were part of the ordinary school program in grade 6, assessed participants’ overall intelligence (Magnusson, Dunér, & Zetterblom, 1975; Kiuru, Salmela-Aro, Nurmi, Zettergren, Andersson, & Bergman, 2012). The mean of the six subscales was used to form the variable intelligence (Cronbach’s α = .84) (Men: M = 24.26, SD = 4.62; Women: M = 24.92, SD = 4.49).

Results

The results are presented for men and women separately. Given that this study examines relatively distal factors of entrepreneurship in adulthood so that effects should be relatively small and hard to detect, results up to the 10% significance level are reported (see also Schmitt-Rodermund, 2004).

Preliminary Analyses

To achieve a first preliminary picture on the relationships between the variables, zero-order relationships between the two entrepreneurship variables on the one hand (Entrepreneurship over the career – no/yes; Entrepreneurship status at age 43 in women and age 47 in men), and the other variables on the other were calculated. To check which variables distinguish entrepreneurs from non-entrepreneurs, two-tailed t-tests were conducted in the case of continuous variables (the three control variables and the two rule-breaking variables) and χ² tests in the case of dichotomous variables (the two crime variables). These zero-order relationships are summarized in Table 1.

The following control variables were associated with the entrepreneurship variables. Parental socioeconomic status was positively associated with entrepreneurship status (at age 43/47) in both genders. Those boys and girls who grew up with higher-status parents were more likely to be working as an entrepreneur at that point in time in middle adulthood.
Moreover, parental SES showed a positive relationship with entrepreneurship over the career in women. Those girls who grew up with higher-status parents had a higher likelihood of having worked at least once as an entrepreneur over their occupational career by the age of 43. Intelligence, measured at age 13, showed a tendency with entrepreneurship over the career in women. Those girls who achieved higher scores in the intelligence tests were more likely to have worked at least once as an entrepreneur in their occupational career by the age of 43.

With regard to the central study variables, rule-breaking behavior in adolescence showed a zero-order relationship with the entrepreneurship over the career variable. Those boys who showed more rule-breaking behavior in adolescence were more likely to have worked as an entrepreneur at least once in their occupational career (assessed until the age of 47). In contrast, neither rule-breaking attitudes in adolescence nor the crime variables (teenage crime, adult crime) showed a relationship with entrepreneurship in adulthood. In other words, compared to non-entrepreneurs, entrepreneurs did not differ in terms of registered teenage or adult crime and early attitudes towards rule-breaking.

Such an analysis looking at teenage crime and adult crime separately may overlook the role that developmental patterns in criminal activity could play in entrepreneurial careers. Such developmental patterns, for example Moffitt’s famous developmental taxonomy of adolescence-limited and life-course persistent criminal behavior (Caspi & Moffitt, 2001), figure prominently in contemporary crime research (Stattin, Kerr, & Bergman, 2010). Hence, an additional analysis using the male sample tested whether male entrepreneurs differ from male non-entrepreneurs in terms of developmental patterns of criminal behavior (not an offender, adolescence-limited offender, adult onset offender, life-course persistent offender, Caspi & Moffitt, 2001). Consistent with earlier research (e.g., Bergman & Andershed, 2009; Stattin et al., 2010), each male respondent was grouped into one of these categories (using the dichotomous teenage and adult crime variables). Then a \( \chi^2 \) test revealed that these
developmental patterns of crime were not associated with any of the entrepreneurship variables. This underscores the result that crime is not related to entrepreneurship, neither teenage/adult crime nor developmental patterns of crime.

**Regression Analyses**

To test the three research questions of the present study, hierarchical logistic regression analyses were employed (Cohen, Cohen, West, & Aiken, 2003). These analyses estimated the controlled effects of the central predictor variables (rule-breaking tendencies and crime) on the two entrepreneurship variables. The first step of the regression considered the control variables; the second step then added the rule-breaking in adolescence variables, and the third the crime variables. Multicollinearity analyses (variance inflation factor, VIF) indicated that the regression results are unbiased in this regard.

Among the control variables (Step 1 of the regression), parental SES showed a positive tendency with entrepreneurship over the career and a positive effect significant at the 5% level on entrepreneurship status at age 47 in men. Moreover, in women creativity in adolescence showed a positive tendency with entrepreneurship over the career and a positive effect significant at the 5% level on entrepreneurship at age 43. In contrast, intelligence did not predict entrepreneurship in adulthood.

Among the rule-breaking in adolescence variables (step 2 of the regression), rule-breaking behavior in adolescence showed a positive effect significant at the 5% level on entrepreneurship over the career in men. Hence, the zero-order relationship between such an early unruly behavior and entrepreneurial activity over the career (as illustrated in Table 1) persisted in this regression analysis. Early rule-breaking attitude, the more latent form of early unruliness, was irrelevant as a predictor of entrepreneurship in adulthood.

Finally, the crime variables (teenage crime, adult crime) showed no relationships with entrepreneurship in adulthood in the third step of the regression. In other words, registered
crime was irrelevant as a predictor of entrepreneurial activity in both genders. Again, among the study variables, early rule-breaking behavior showed up as a valid predictor here.

Drawing from prior research pointing to the relevance of intraindividual constellations of personal factors when describing and understanding the entrepreneur (e.g., Obschonka, Schmitt-Rodermund, Silbereisen, Gosling, & Potter, in press) and Schumpeter’s (1934) theorizing suggesting that the entrepreneur may actually need both creativity and rule-breaking (“creative destruction”), a follow-up analysis checked for interactions between the early antisocial tendencies (rule-breaking attitudes and behaviors in adolescence, and teenage crime) and early intellectual competencies (intelligence and creativity). This tests the idea that when both a bright, creative mind and rule-breaking tendencies come together early in life, then a developmental pathway towards entrepreneurship may be particularly likely. It seems plausible to assume that early antisocial rule-breaking may be canalized into productive rule-breaking in adulthood (e.g., entrepreneurial agency) by high levels of intellectual competencies. Interaction tests were conducted following Cohen et al.’s (2003) recommendations. However, there was no indication for interactions between intellectual competencies and early antisocial tendencies in the prediction of entrepreneurship.

Discussion
The first research question of the present study examined whether Zhang and Arvey’s (2009) retrospective finding suggesting that entrepreneurs are special in that they show (modest but not severe forms of) early antisocial rule-breaking in adolescence more often than others can be replicated longitudinally. The data revealed that antisocial rule-breaking behavior in adolescence (modest early rule-breaking) indeed matters as a valid predictor of entrepreneurship in adulthood, but only among men and particularly in the prediction of entrepreneurship over the career (whether the male participants worked at least once as an entrepreneur in their occupational career up to the age of 47). Here, it was in fact the strongest
predictor among all variables considered in this study (control and study variables). In contrast, more severe antisocial rule-breaking behavior in adolescence, namely registered teenage crime, did not forecast enterprising activity in adulthood. For men, the present study thus replicates Zhang and Arvey’s (2009) central finding that modest but not severe antisocial rule-breaking in adolescence is associated with entrepreneurship in adulthood, but one should keep in mind that this applied only for the long-term entrepreneurship measure. This underscores the importance of considering a career perspective (Vondracek, 2001) and looking at (potential) entrepreneurship over longer periods in the occupational career, particularly if one studies distal predictors (Davidsson, 2007).

The second research question asked: What matters more as a precursor of entrepreneurship in adulthood, latent or manifest antisocial tendencies? Regarding men, the clear message from the present analysis is that the actual modest but not severe rule-breaking behavior, as a manifest form, matters more than the latent form (early antisocial attitudes). This concurs with behavioral approaches in entrepreneurship research stressing the role of actions and human agency (Frese, 2009). It is further consistent with a number of existing developmental studies indicating that behavioral measures targeting the teenage years (e.g., early leadership, inventive, and commercialization activities as early age-appropriate forms of entrepreneurial human agency) are particularly predictive for entrepreneurship in adulthood (e.g., Obschonka, Silbereisen, & Schmitt-Rodermund, 2010; Schmitt-Rodermund, 2007). Entrepreneurs are often described as the type of persons that first and foremost act and such an emphasis on human agency may also apply to their early personal development. In adolescence, they may have a certain drive to behave in antisocial ways (with regard to modest rule-breaking). Among women, the picture was less clear as both latent (attitude) and manifest forms of antisocial tendencies (rule-breaking behavior, crime) did not show any relationships with entrepreneurship in adulthood.
In view of these results and the results referring to the first research question, one must answer the third research question (whether results would differ between men and women) with a clear yes. Aspects of early antisocial tendencies (rule-breaking behavior) appear to matter much more in men as a developmental precursor of engagement in entrepreneurship in adulthood. Severe rule-breaking (registered crime) did not show any effects on entrepreneurship at all in either gender, but one should keep in mind that in the present study unfortunately no measure of early severe antisocial rule-breaking behavior in women was available. These gender-specific results illustrate the importance of looking at both genders separately in developmental research on entrepreneurship. Career paths and their determinants may substantially differ between male and female entrepreneurs as suggested by a number of existing studies (Kelley, Brush, Green, & Litovsky, 2011; Schoon & Duckworth, 2012). Likewise, gender aspects have been shown to play an important role in developmental research on patterns and determinants of antisocial behavior (Moffitt, Caspi, Rutter, & Silva, 2001). If female entrepreneurship, in contrast to male entrepreneurship, indeed does not develop so much out of early antisocial tendencies, the question arises whether this gender difference establishes a developmental fundament for gender differences in the actual entrepreneurial behavior in adulthood (for example in gender differences in the “radicality” of constructive rule-breaking as an entrepreneur, or in risk-taking and growth aspirations when starting and growing new businesses, Morris, Miyasaki, Watters, & Coombes, 2006).

Regarding effects of the control variables, it was interesting to see that general intelligence, assessed in adolescence, was irrelevant in the prediction of entrepreneurship. This is consistent with research indicating that it is not general intelligence but, if anything, specific facets of intelligence that matters for entrepreneurship (e.g., analytical, creative, and practical aspects of intelligence, Baum & Bird, 2010; Sternberg, 2004).

The present study also delivers interesting results regarding early creativity and
socioeconomic background. Creativity is an often-named prototypical entrepreneurial characteristic because seminal theorizing on the entrepreneur gives creative behaviors a unique role (e.g., with regard to innovation, business idea generation, and venture creation; Audretsch, 2007; Schumpeter, 1934; see also Ward, 2004). Indeed, some studies have found entrepreneurs to differ from non-entrepreneurs in terms of higher levels of creativity (e.g., Engle, Mah, & Sadri, 1997). Due to their cross-sectional or short-term focus, such studies usually cannot disentangle (long-term) selection and socialization processes (for example whether higher levels of creativity are a cause or a consequence of entrepreneurship; cf. Kohn & Schooler, 1982). In the present study, creativity differences in adolescence mattered in the prediction of entrepreneurship in women, but did not show any zero-order relationships with entrepreneurship in either gender. One should keep in mind that creativity assessed as early as in adolescence is relatively distal to the occupational career, which may explain some of these weak relationships. Future studies could put a special focus on the mutual interplay between creativity and entrepreneurial activity. It might be particularly interesting to explore possible socialization processes associated with entrepreneurial work experiences – does entrepreneurial work enhance creativity over time?

Finally, early interindividual differences in parental socioeconomic status appear to exert long-term (or cumulative) effects on entrepreneurial career choices in adulthood. The regression result that those boys who grew up with wealthier and more educated parents had a higher likelihood of entrepreneurship in adulthood may have to do with the provision of certain resources by the parents (e.g., financial capital or networks) that facilitate entrepreneurial behavior among their offspring.

**Limitations**

Although the present study has several advantages (e.g., longitudinal data, the richness of the rule-breaking and crime data, etc.), it also has a number of limitations. First, it does not look
at the actual kind of entrepreneurial activity in adulthood (e.g., which type of business, economic sector, innovation) or at entrepreneurial success. However, this is similar to the original study by Zhang and Arvey (2009). Future studies looking at antisocial tendencies in the individual development of entrepreneurs may also consider these entrepreneurial work outcomes. Do, for example, those entrepreneurs who showed higher levels of antisocial tendencies in adolescence found different types of businesses or achieve better entrepreneurial success than less unruly entrepreneurs?

Second, regarding crime data only registered crime was considered (Bergman & Andershed, 2009). The present study thus cannot draw any conclusion on potential “hidden” criminal activities in entrepreneurial development that were not registered in official records. This study could thus somewhat underestimate the effect of severe rule-breaking.

Third, the reader should keep in mind that this study could not consider a measure of severe rule-breaking behavior in adolescence in the female sample, but the results point to the direction that early rule-breaking is in general rather unimportant as a developmental precursor of female entrepreneurship.

Conclusion

Despite these potential limitations, the longitudinal results presented here support the unruliness hypothesis of adolescent entrepreneurial development in men (Zhang & Arvey, 2009). Taking Zhang and Arvey’s and this study together, the relationship between modest antisocial behavior in adolescence and male entrepreneurship in adulthood becomes clearer and clearer. While Harvard Business School Professor Abraham Zaleznick once noted: “I think if we want to understand the entrepreneur, we should look at the juvenile delinquent” (cited in Solomon, 1996, p. 85; see also Gould, 1969), one might also say: “If we want to understand the (development of the male) entrepreneur, we should look at the juvenile (modest) rule-breaking behavior”.

The fact that the present study found no systematic relationship between crime and entrepreneurship at all (in either gender) implies that the “dark side” of male entrepreneurship in terms of early antisocial tendencies may actually be limited to modest misconduct in their younger years (misconduct that may indeed indicate a certain early antisocial tendency but does not fundamentally violate societal principles or cause damage to society as more severe antisocial behaviors such as crime do). These results thus do not draw an overly negative picture regarding antisocial tendencies among entrepreneurs. The results rather suggest that male entrepreneurs, when compared to male non-entrepreneurs, may go through a somewhat stronger rebellious and non-conformist phase in adolescence with regard to their behaviors; they may “drift” towards antisocial involvements in their adolescent years (Hagan, 1991) without becoming outlaws or developing into notorious criminals. According to Zhang and Arvey’s (2009) analysis, an increased level in the trait risk-taking among prospective entrepreneurs might contribute to these more unruly teenage years in this group.

To sum up, there are indeed two sides of the same coin: on the one side entrepreneurial agency and on the other early antisocial tendencies in males in the form of modest rule-breaking behavior. However, the data also points to the direction that these prospective male entrepreneurs are then well-adapted in adulthood. This would integrate, on the one hand, the research stressing the prosocial side of many entrepreneurs and their business activities (Harris, Sapienza, & Bowie, 2009) and, on the other hand, the growing evidence of particularly frequent (modest, not severe) antisocial rule-breaking behaviors during the teenage years of many male entrepreneurs. And, last but not least, it would solve the apparent paradox of finding early mug shots (associated with minor offences) of those that became famous entrepreneurs and a positive role model and inspiration for generations of new entrepreneurs.
References


Bergman, L. R. (2000). *Women’s health, work, and education in a life-span perspective. Technical report 1: Theoretical background and overview of the data collection (Reports from the project IDA, No. 70)*. Stockholm: Stockholm University, Department of psychology.


Bergman, L. R., Andershed, H., & Andershed, A.-K. (2009). Types and continua in


63(6), 160-167.


### Table 1

**Zero-Order Relationships between the Control, Crime, and Rule-Breaking Variables and the Entrepreneurship Variables**

<table>
<thead>
<tr>
<th>Control variable:</th>
<th>Entrepreneurship over the career</th>
<th>Entrepreneurship status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no / yes</td>
<td>Statistical test</td>
</tr>
<tr>
<td>Parents’ SES</td>
<td>-.07/.22</td>
<td>$t(359) = -1.50$</td>
</tr>
<tr>
<td></td>
<td>.05/.68</td>
<td>$t(455) = -2.18^{*}$</td>
</tr>
<tr>
<td>Creativity (Age 13/16)</td>
<td>-.03/.01</td>
<td>$t(324) = -3.89$</td>
</tr>
<tr>
<td></td>
<td>-.03/.16</td>
<td>$t(493) = -1.38$</td>
</tr>
<tr>
<td>Intelligence (Age 13)</td>
<td>24.72/25.10</td>
<td>$t(321) = -0.70$</td>
</tr>
<tr>
<td></td>
<td>25.12/26.30</td>
<td>$t(435) = -1.69^{†}$</td>
</tr>
<tr>
<td>Central variables:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rule-breaking attitude in adolescence (Age 15)</td>
<td>2.57/2.63</td>
<td>$t(295) = -0.47$</td>
</tr>
<tr>
<td>Rule-breaking behavior in adolescence (Age 15)</td>
<td>2.58/2.79</td>
<td>$t(51) = -1.22$</td>
</tr>
<tr>
<td>Teenage crime (no/yes)</td>
<td>1.93/2.17</td>
<td>$t(155) = -2.10^{*}$</td>
</tr>
<tr>
<td></td>
<td>1.82/1.98</td>
<td>$t(443) = -1.50$</td>
</tr>
<tr>
<td>Adult crime (no/yes)</td>
<td>31.6% / 34.3%</td>
<td>$\chi(1) = .19$</td>
</tr>
<tr>
<td></td>
<td>30.6% / 36.7%</td>
<td>$\chi(1) = 1.15$</td>
</tr>
<tr>
<td></td>
<td>9.9% / 10.0%</td>
<td>$\chi(1) = .00$</td>
</tr>
</tbody>
</table>

Note. Values in bold refer to the male sample; underlined values refer to the female sample. a The variable Teenage crime was not considered in the female sample due to the low prevalence (2.2% of the females had registered teenage crime). b The values in this column refer to mean scores in the case of continuous variables (mean of non-entrepreneurs / mean of entrepreneurs), and to percentages in the case of dichotomous variables (prevalence of entrepreneurship among those who showed no teenage or adult crime / prevalence of entrepreneurship among those who showed teenage or adult crime). 

†$p < .10$. *$p < .05$. **$p < .01$. 

Statistical test $t$; $\chi(1)$.
### Table 2

**Hierarchical Logistic Regression Analyses**

<table>
<thead>
<tr>
<th>Control variable:</th>
<th>Entrepreneurs over the career (1 = yes)</th>
<th>Entrepreneurs status (Males: Age 47 / Females: Age 43) (1 = yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Step 1</td>
<td>Step 2</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
</tr>
<tr>
<td><strong>Parents’ SES</strong></td>
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<td>0.08</td>
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<tr>
<td></td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td><strong>Creativity</strong></td>
<td>-0.04</td>
<td>0.16</td>
</tr>
<tr>
<td>(Age 13/16)</td>
<td>0.42</td>
<td>0.22</td>
</tr>
<tr>
<td><strong>Intelligence</strong></td>
<td>0.00</td>
<td>0.03</td>
</tr>
<tr>
<td>(Age 13)</td>
<td>0.08</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Central variables:</strong></td>
<td> </td>
<td> </td>
</tr>
<tr>
<td>Rule-breaking attitude</td>
<td>-0.33</td>
<td>0.21</td>
</tr>
<tr>
<td>in adolescence (Age 15)</td>
<td>0.01</td>
<td>0.30</td>
</tr>
<tr>
<td>Rule-breaking behavior</td>
<td>0.65</td>
<td>0.27</td>
</tr>
<tr>
<td>in adolescence (Age 15)</td>
<td>0.33</td>
<td>0.38</td>
</tr>
<tr>
<td>Teenage crime * (1 = yes)</td>
<td>0.18</td>
<td>0.38</td>
</tr>
<tr>
<td>Adult crime (1 = yes)</td>
<td>0.36</td>
<td>0.33</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R² (Nagelkerke)</th>
<th>.06</th>
<th>.05</th>
<th>.05</th>
<th>.04</th>
<th>.05</th>
<th>.07</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>285</td>
<td>285</td>
<td>285</td>
<td>294</td>
<td>294</td>
<td>294</td>
</tr>
</tbody>
</table>

Values in bold refer to the male sample; underlined values refer to the female sample. *The variable Teenage crime was not considered in the female sample due to the low prevalence. OR = Odds ratio.

†p < .10. *p < .05. **p < .01. ***p < .001.