Personality and mental health changes throughout the course of university police training in Sweden

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ABSTRACT
Police trainees have to be prepared for future job demands and challenges. Personality plays an important role in stress management. The first assessment of a longitudinal investigation was conducted among 103 Swedish police trainees to study their personality changes and mental health responses in first two weeks after intake. Fifty-two of these trainees, who participated in the second assessment, were included in the analysis. The Temperament and Character Inventory (TCI) was used to measure personality, and the Symptom Checklist-90-Revised (SCL-90-R) was used to measure mental health. A multiple regression analysis was performed with personality scores from the first assessment as independent variables and SCL-90-R scores as dependent variables. Over two years, minor changes were found in the police trainees’ personality characteristics, which seemingly fit the demands of policing and are potentially valuable in the trainees’ future careers. Personality characteristics are predictors of mental health at the end of university training.

Keywords  
Personality, Stress management, Mental health, Police trainee
INTRODUCTION

Police officer trainees are internationally recognized as being highly selected, relatively mature and healthy individuals (e.g., du Preez, Cassimjee, Lauritz, Ghazinour, & Richter, 2011; Ghazinour, Lauritz, du Preez, Cassimjee, & Richter, 2010). However, a relatively high percentage of them develop psychological symptoms of various kinds after some years in policing (e.g., Lee, Kim, Won, & Roh, 2016; Schwarzer, Cone, & Bowler, 2016; Stanley, Hom, & Joiner, 2016; Violanti, Andrew, Mnatsakanova, Hartley, Fekedulegn, & Burchfiel, 2016). Due to the link between exposure to traumatic situations and pathogenic consequences (Gabriel et al., 2007), police officers have been considered at high risk of developing post-traumatic stress, psychological disturbances, and poor physical health (de Terte, Stephens, & Huddleston, 2014). This heightened risk might be one of the reasons for the considerable interest in research on the police profession in recent years. Personality characteristics seem to have an impact in this respect (du Preez et al., 2011; Ghazinour et al., 2010).

The police work is complex because officers are required to play very different roles; sometimes they are fighting for their survival on the street (e.g., when confronting life-threatening situations), and, at other times, they have to emotionally support victims of crime (e.g., battered children). This dual role exists because police are usually the first caregiving professionals to arrive at a crime scene (Manzella & Papazoglou, 2014). Both before and after police training, officers are likely to experience physiological arousal before, during, and even after exposure to stressful and potentially critical or traumatic events (Andersen, Papazoglou, Arnetz, & Collins, 2015; Wills & Schuldberg, 2016). The effect of traumatic life events within the police work environment has an impact on officers work performance. A negative consequence of police work on officers’ personality created research fields such as “police personality”.

A body of research investigating police personality have been concerned with negative aspects of personality, including cynicism, authoritarianism, and psychopathology (Gerber & Ward, 2008), with some emphasizing that authoritarianism increases over time as officers enter a work culture (Genz & Lester, 1976; Niederhoffer, 1967), adopting an occupational personality (Wills & Schuldberg, 2016). Additional characteristics have been associated with police personalities as well: suspicious, solidaristic, conservative, alienated and thoroughly bigoted (Balch, 1977; Skolnick, 1977). Watson and Sterling (1969) described police officers as possessing these attributes: pragmatism, action oriented, valuing common sense rather than theory and success more than ideas. They also noted that the tendency towards pragmatism is closely associated to cynicism. Police cynicism was defined as an attitude of “contemptuous distrust of human nature and motives (Behrend, 1980). According to Graves (1996) police cynicism is a distinct characteristic of police personality. He observed that cynicism, particularly prevalent in larger urban departments, develops as a result of burnout and stress, the emotional conditions caused largely by the excessive demands of police work (Twersky-Glasner, 2005).

Forero and colleagues (2009) conducted a structural equation model analysis based on longitudinal data to examine the predictive validity of the training process for actual performance after graduation. Their results suggest that actual job performance is indeed influenced by personality, but that this influence is mediated by training. Williams, Ciarocchi, and Dean (2010) followed 60 police trainees from recruitment to integration at workplace
to determine if mindfulness, emotional awareness, and resilience predict improvement in mental health and wellbeing in the police recruits after 1 year of service. Their study indicated that mindfulness predicted depression at follow up, while emotion identification skills predicted general mental health. The authors concluded that police officers and police organisations may benefit from interventions aiming at developing and promoting mindfulness and emotion identification.

To help police academies to enhance police trainees’ coping resources related to the adversities that they will encounter in their future work, several research projects have recently been conducted in Scandinavia: in Finland, leadership in police organizations, a changing security environment and evolving security discussions (Huotari, 2011; Laitinen, 2011); in Norway, personalities and preferences for conflict resolution tactics (Abrahamsen, 2006); in Denmark, the consequences of losing local affiliations (Holmberg, 2011); and, in Sweden, police trainees’ socialization (Rantatalo, Karp, Ghazinour, & Lauritz, 2015), police trainees’ mental health and personalities (Ghazinour et al., 2010), and anger related to psychopathology, temperament and character in police trainees (Ghazinour & Richter, 2009).

Personality characteristics of police officers and their development represent important research topics because they are, for example, known to be major determinants of mental illness/health (García-Montes, Martínez, Pérez-Álvarez, & Díaz, 2005; Hansenne et al., 1999; Richter et al., 2003), coping behaviors (Carver & Connor-Smith, 2010; Richter, Lauritz, Preez, Cassimjee, & Ghazinour, 2013), and decision-making processes (Dewberry, Juanchich, & Narendran, 2013; Pohling, Bzdk, Eigenstetter, Stumpf, & Strobel, 2016; Rahaman, 2014; Schwarz, 2000).

Cloninger’s (1984) psychobiological model of personality contributes to enhance our understanding of human behavior not only from character or performance angles what several investigations did. It is assumed that applying both constructs, temperament and character in combination, can lead to comprehensive solutions to protect police staff.

Cloninger’s psychobiological model of personality

Personality can be understood as the integrated sum of an individual’s current and potential emotional reactions combined with associated behavior and behavioral patterns determined by genetic (biologically based) and environmental (socialization based) processes and their interactions throughout an individual’s lifetime. Eysenck (1999) defined four main sectors that continuously interact: the cognitive (intelligence), the affective (temperament), the conative (character), and the somatic (constitution) sector. This definition implies that "personality is the characteristic manner in which one thinks, feels, behaves and relates to others" (Widiger, 2011, p. 103). Previously, Cloninger and colleagues developed a comprehensive personality theory, which is derived from a psychobiological perspective related to mental health and well-being. According to this theory, personality comprises of two major systems—temperament and character. Temperament is defined as genetically largely independently inherited and homogenous traits reflecting individual differences in conditioned emotional responses. Four distinct temperament domains have been described: novelty seeking (NS), which concerns the behavior activation system determining emotional responses and behavior in response to novel stimuli or cues; harm avoidance (HA), which
relates to the behavior inhibition system as a heritable bias in the inhibition or cessation of behaviour; reward dependence (RD), which concerns the behavior maintenance system determining maintenance or pursuing ongoing behaviour; and persistence (PS), which is based on individual differences in the persistence of behavior, despite intermittent reinforcement regulating perseverance in behaviour despite frustration and fatigue.

Character traits reflect individual differences in self-concepts, which are supposed to be pre-dominantly determined by socialisation processes during the lifespan that are based on an individual’s relationships with himself or herself reflecting the extent to which a person identifies the self as an autonomous individual (self-directedness – SD), with other individuals and groups of individuals reflecting the extent to which a person identifies the self as a social individual (cooperativeness – CO), and with the whole universe reflecting the intensity of identification with unity of all things (self-transcendence – ST) on various levels (Cloninger, 1986, 1987; Cloninger, Przybeck, Svrakic, & Wetzel, 1994). Personality is assumed to be relatively stable. On the one hand, personality domains are usually conceptualized as traits (as with Cloninger’s theory), implying stability and constancy; on the other hand, evidence has shown that complex interactions within and between an individual and his or her environment result in personality changes throughout his or her life, which emphasizes the potential plasticity of personality as a function of contextual variables (e.g., Baltes, Lindenberger, & Staudinger, 1998; Helson, Jones, & Kwan, 2002; Roberts, Robins, Caspi, & Trzesniewski, 2003). Caspi and Roberts (2001) suggested several potential processes that result in personality changes across the lifespan—self-insight (i.e., watching oneself), social/model learning (i.e., watching and listening to others), changes in social roles, life events, and social environments – that can trigger personality changes (e.g., experiences in careers, marriage). Personality and psychopathology are related to one another in three different ways (Widiger & Smith, 2008). Personality and psychopathology can influence the presentation or appearance of one another, commonly referred to as a pathoplastic relationship. They can share a common, underlying etiology, referred to as a spectrum relationship. And, finally, they can have a causal role in the development or etiology of one another (Widiger, 2011).

In a previous study, Swedish police trainees were found to be much healthier; avoiding harm less often; and behaving more often responsibly and reliably compared to individuals from the general Swedish population upon entry to police academy (Ghazinour et al., 2010). ‘Mental health is defined as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community.’ (WHO, 2015). However, psychological disorders represent specific groups of disturbances of one or more psychological functions that have a clinical impact on an individual’s well-being (Widiger, 2011). Ample evidence has shown that personality and well-being or psychopathology, possibly on the opposite end of the spectrum, are significantly associated with one another. For example, negative affectivity (or neuroticism or harm avoidance) is significantly related to anxiety and depression (Hansenne et al., 1999; Richter, Polak, & Eisemann, 2003); low extroversion is significantly related to depression (Janowsky, 2001); metacognitive variables, such as loss of cognitive confidence, predict paranoid ideation and trait anxiety (Hansenne et al., 1999). Various models have been developed to explain the relation-
ships between personality and psychopathology. The pathoplastic model suggests an influence of the appearance of one construct on that of another, with possible influences in both directions; the spectrum model suggests a shared, common, underlying etiology; and causal models suggest causal impacts in the course of development of one construct onto another, and vice versa (Widiger, 2011).

Therefore, this investigation focused on an analysis of a) differences in personality characteristics and psychopathological symptoms between police trainees at the end of their university training and individuals of similar age from the Swedish general population; b) changes in police trainees’ personality characteristics during their two-year university training; c) time-lagged relationships between personality and mental health; and d) associations between changes in personality characteristics and changes in mental health during this period.

METHODS
Setting
In Sweden, the university training for police comprises two years of theoretical training and six months of practical training during a placement in a community police department. The theoretical part includes special courses on communication in demanding situations (e.g., talking to psychotic individuals, suicidal individuals, or individuals who have been involved in a car accident), which are led by teachers from academy and police officers. Such courses focus on improving communication, collaboration, or interaction skills by enhancing self-reflection and self-focused psycho-hygiene.

The Ethics Committee at Umeå University approved the study protocol (Dnr 08-018M). The trainees were informed about investigation’s aims, and they provided their written consent before participating in the study. Participation was voluntary.

Data collection and Sample
The participants were asked to complete a socio-demographic questionnaire, the Temperament and Character Inventory (TCI), the Symptom Checklist-90-Revised (SCL-90-R), the Ways of Coping (WOC) and the State Trait Anger Expression Inventory (STAXI-II). However, the current study exclusively focuses on TCI and SCL-90-R data. It is part of a more comprehensive longitudinal research project on resilience in police officers (see, for example, Ghazinour et al., 2010; Ghazinour & Richter, 2009; Richter et al., 2013).

The study sample consisted of police trainees from one of three Swedish police academies between 2008–2009 that were investigated twice with an average time lag of approximately two years—from their entry into their university training to shortly before completing their theoretical training and starting their one-year placement at a community police department. Of the 103 trainees who participated in the first assessment of the research project within the first two weeks after intake, 52 participated in the second assessment. The participants’ Swedish social security numbers were used as the unique key variable to merge the information from the first and second assessments. Although the drop-out rate...
from the first to second assessment was very high (49.5%), the findings based on data for the remaining individuals were seemingly not biased by age, gender, civil status, any personality score, and/or psychopathological scores from first assessment, as no significant differences between those who participated in both assessments and those who only participated in the first assessment were found for any of these variables.

MEASUREMENT

Personality
The Temperament and Character Inventory (TCI) (Cloninger et al., 1994) measures the four temperament dimensions harm avoidance (HA), novelty seeking (NS), reward dependence (RD), and persistence (PS) based on Cloninger’s unified psychobiological theory of personality and the three character dimensions self-directedness (SD), cooperativeness (CO), and self-transcendence (ST) (see above). All personality dimensions but persistence (PS – eight item single scale) are assessed based of several subscales containing items that cover a variety of possible emotional or behavioral expressions of the dimension depending on the situation interacting with the individual’s perception with harm avoidance composed of four subscales (anticipatory worry (HA1), fear of uncertainty (HA2), shyness (HA3), fatigability (HA4)); novelty seeking combining four subscales (exploratory excitability (NS1), impulsiveness (NS2), extravagance (NS3), disorderliness (NS4)); reward dependence (RD) and self-transcendence consisting of three subscales (sentimentality (RD1), attachment (RD2), dependence (RD3); and self-forgetfulness (ST1), transpersonal identification (ST2), and spiritual acceptance (ST3), respectively); and self-directedness (SD) and cooperativeness comprising of five subscales each (responsibility (SD1), purposefulness (SD2), resourcefulness (SD3), self-acceptance (SD4), enlightened second nature (SD5), and social acceptance (CO1), empathy (CO2), helpfulness (CO3), compassion (CO4), integrated conscience (CO5), respectively). This self-administered paper-and-pencil test consists of 240 items in a true/false format and takes approximately 20 to 30 minutes to complete. Its psychometric properties have been demonstrated separately for versions in several languages (e.g., for the Swedish version Brändström, Sigvardsson, Nylander, & Richter, 2008) using established personality theories for different groups of individuals in the general population and patients as well as with respect to neurobiological parameters.

Mental health symptoms
The Symptom Checklist-90–Revised (SCL-90–R) is a 90-item symptom inventory, in which each symptom is rated on a 5-point scale (ranging from 0 = Not at all to 4 = Extremely) to reflect the severity of psychological problems and psychopathological symptoms and their intensity in community, medical, and psychiatric settings at a specific point in time. This inventory includes nine clinical scales: somatization (recurrent and multiple clinically substantial complaints about physical symptoms like pain or fatigue based on related anxious feelings), obsessive-compulsive (repeatedly occurring unwanted, intrusive and distressing or anxiety-provoking thoughts; unwanted repeatedly performed behav-
Journal acts), interpersonal sensitivity (sensitivity for indicators of critique, sympathy, and generally evaluating signs in interpersonal relationships), depression (intense feelings of sadness, hopelessness, low mood), anxiety (often as anxious anticipation of possible future events combined with psychophysiological symptoms like increasing blood pressure, heart rate, or sweating), hostility (expression of anger or aggression in interpersonal relationships), phobic anxiety (persistent fear of an object or a situation), paranoid ideation (ruminative suspicious thoughts in a sense of interpretations or assumptions of others’ causes of behaviours), and psychoticism (emotional and behavioral expression derived from aloof, impulsive, susceptible, or antisocial actions). The reliability and validity of the SCL-90-R have been demonstrated as adequate (Derogatis, 1994; Derogatis & Cleary, 1977; Fridell et al., 2002). The internal consistency (Cronbach’s alpha) of the symptom scale scores range from 0.77 for psychoticism to 0.90 for depression (Derogatis & Cleary, 1977). The internal consistency was found 0.96 in the current study.

Statistical analysis
The missing values for some TCI items—which did not exceed two items per person—were imputed (replaced) through regression method using the rest of the items from the same subscale. We explored the data for fulfillment of prerequisites to perform the various multivariate analyses planned. To determine multivariate outliers in the data we calculated Mahalanobis distances. Not any participant was detected as an multivariate outlier based on the various combinations of variables in the different calculations (all Mahalanobis distance scores were below the smallest critical value 27.88 with p = 0.001 and DF = 9). Applying Shapiro Wilk’s test for normality, exclusively the scores of novelty seeking and reward dependence from both assessments followed a normal distribution. All other personality and psychopathological scores did not comply with the requirement that should be fulfilled by the quality of the data to be enabled meaningfully to interpret the findings. However, taking into account small sample size and the highly selected nature of the participants this finding was expected. Because of the explorative approach of the presented investigation it was decided to run the planned statistical procedures despite these limitations. The mean scores of the TCI and SCL-90-R from the end of the university training were compared with published data from the Swedish general population by means of t-tests for independent samples (comparison data taken from Brändström et al. (2008) for the TCI and from Fridell, Cesarec, Johansson, & Thorsen (2002) for the SCL-90-R). The scores for the TCI and SCL-90-R scales and subscales from entry into university training and the completion of approximately three years of training were compared by means of multivariate analysis of variance (MANOVA) repeated measures. This method is used to assess SCL-90-R and TCI differences between first and second assessment simultaneously across multiple measurements. Time-lagged hierarchical multiple regression analysis was performed with corresponding SCL-90-R symptom scores and personality domain scores from the entry assessment as independent variables and SCL-90-R scores from the second assessment as dependent variables. Spearman’s rank correlations between personality and psychopathological change scores were calculated because the scores did not follow a normal distribution. Analyses were conducted with the statistical software Stata version 10.0 (Stata Corporation, College Station, Texas).
RESULTS

Fifty two students participated in this study (67% males). Their baseline age ranged between 20 and 38 years (mean age = 25, SD = 4). Nearly half of the participants were single, more than half (55%) had already gained a university degree; and nearly one third (31%) completed secondary school before entering police academy.

At the end of their university training, the students scored, on average, significantly lower in harm avoidance (t = 2.91; p = 0.002) and in self transcendence (t = 3.02; p = 0.002) and significantly higher in reward dependence (t = 2.25; p = 0.013), self-directedness (t = 3.77; p < 0.001), and cooperativeness (t = 3.11; p < 0.001) than Swedish individuals of the same age from the general population (Tables 1 and 2). Furthermore, they scored significantly lower on most of the psychopathological scores of the SCL-90-R (except for obsessive-compulsive and depression) than individuals from the Swedish general population, with t-test values ranging between 2.30 (p = 0.013) for somatization and 9.43 (p < 0.001) for phobic anxiety (p < 0.001 also for anxiety, paranoid ideation, and hostility) (data from the general population not presented; taken from Brändström et al., 2008; and Fridell et al., 2002, respectively).

Table 1: Multivariate analysis of variance (MANOVA), repeated measurement, results for SCL-90 and TCI domain and subscale scores (N=52)

<table>
<thead>
<tr>
<th>Effect</th>
<th>Pillai’ trace</th>
<th>F</th>
<th>df/df</th>
<th>P-value</th>
<th>η²</th>
<th>power</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCL-90</td>
<td>0.36</td>
<td>2.36</td>
<td>9/38</td>
<td>0.031</td>
<td>0.359</td>
<td>0.844</td>
</tr>
<tr>
<td>TCI domains</td>
<td>0.27</td>
<td>2.35</td>
<td>7/45</td>
<td>0.039</td>
<td>0.268</td>
<td>0.793</td>
</tr>
<tr>
<td>TCI subscales</td>
<td>0.62</td>
<td>1.79</td>
<td>25/27</td>
<td>0.072</td>
<td>0.623</td>
<td>0.863</td>
</tr>
</tbody>
</table>

Table 2: TCI domains (mean± SD) upon entry and at the end of university training (average follow-up period two years) N=52

<table>
<thead>
<tr>
<th>TCI domain</th>
<th>upon entry</th>
<th>end</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperament</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novelty Seeking</td>
<td>21.9 ± 4.1</td>
<td>20.6 ± 4.8</td>
<td>3.84</td>
<td>0.060</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td>10.0±5.2</td>
<td>10.6±5.0</td>
<td>0.77</td>
<td>0.380</td>
</tr>
<tr>
<td>Reward Dependence</td>
<td>16.5±2.8</td>
<td>17.0±3.6</td>
<td>1.31</td>
<td>0.252</td>
</tr>
<tr>
<td>Persistence</td>
<td>4.8±2.0</td>
<td>4.7±1.9</td>
<td>0.23</td>
<td>0.637</td>
</tr>
<tr>
<td><strong>Character</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Directedness</td>
<td>35.2±5.0</td>
<td>35.7±4.9</td>
<td>0.63</td>
<td>0.431</td>
</tr>
<tr>
<td>Cooperativeness</td>
<td>36.1±3.6</td>
<td>35.9±3.2</td>
<td>0.07</td>
<td>0.792</td>
</tr>
<tr>
<td>Self-Transcendence</td>
<td>11.0 ± 5.3</td>
<td>9.4 ± 4.3</td>
<td>7.29</td>
<td>0.009</td>
</tr>
</tbody>
</table>

In a multivariate analysis of variance (MANOVA), repeated measure, related to the TCI domains, a significant difference was found between the two assessments (Tables 1 and 2),
which was mainly based on the significant reduction in self transcendence and a borderline significant reduction in novelty seeking. More specifically, the reduction in self transcendence was based on the reductions in subscales ST3 (spiritual acceptance versus rational materialism – F = 10.57; p = 0.002) and in NS1 (exploratory excitability versus stoic rigidity – F = 3.39; p = 0.072) and NS2 (impulsiveness versus thoughtfulness – F = 6.28; p = 0.015) (mean scores for TCI subscales not presented).

Furthermore, a reduction in psychopathological symptoms was indicated by significant MANOVA results related to the SCL-90-R scores based on the significant reduction in phobic anxiety and in psychoticism (borderline significant) from assessment one to assessment two (Tables 1 and 3). Mean score for phobic anxiety upon entry was 0.08 which was reduced to 0.02 at the end of the follow-up and psychoticism reduced from 0.22 to 0.14, suggesting that students experience less phobic anxiety and less psychoticism after the training.

Table 3: SCL-90 sub-scales (mean± SD) upon entry and at the end of university training (average follow-up period of two years) N=52

<table>
<thead>
<tr>
<th>SCL-90-R scales</th>
<th>upon entry</th>
<th>end</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatization</td>
<td>0.31±0.32</td>
<td>0.34±0.37</td>
<td>0.29</td>
<td>0.593</td>
</tr>
<tr>
<td>Obsessive compulsive</td>
<td>0.65±0.51</td>
<td>0.61±0.53</td>
<td>0.39</td>
<td>0.535</td>
</tr>
<tr>
<td>Interpersonal sensitivity</td>
<td>0.39±0.49</td>
<td>0.35±0.35</td>
<td>0.33</td>
<td>0.562</td>
</tr>
<tr>
<td>Depression</td>
<td>0.55±0.48</td>
<td>0.62±0.61</td>
<td>0.75</td>
<td>0.397</td>
</tr>
<tr>
<td>Anxiety</td>
<td>0.37±0.34</td>
<td>0.33±0.36</td>
<td>0.52</td>
<td>0.470</td>
</tr>
<tr>
<td>Hostility</td>
<td>0.09±0.14</td>
<td>0.14±0.20</td>
<td>3.19</td>
<td>0.081</td>
</tr>
<tr>
<td>Phobic anxiety</td>
<td>0.08±0.15</td>
<td>0.02±0.06</td>
<td>9.18</td>
<td>0.003</td>
</tr>
<tr>
<td>Paranoid</td>
<td>0.23±0.33</td>
<td>0.20±0.33</td>
<td>0.17</td>
<td>0.682</td>
</tr>
<tr>
<td>Psychoticism</td>
<td>0.22±0.29</td>
<td>0.14±0.25</td>
<td>6.12</td>
<td>0.069</td>
</tr>
</tbody>
</table>

The variance of seven of the nine SCL-90-R scores from second assessment were significantly explained by the variation of a variety of combinations of personality scores and psychopathological scores from the first assessment (exclusively the same variables like those predicted of the second assessment were applied – e.g., depression scores from first and second assessment or in other words, for example, depression from first assessment needs to be included in the model to assess its predictability for depression at second assessment, since it is known that a score from a previous assessment usually is its best predictor of subsequent scores). This means that personality of students could predict their psychopathological symptoms. Independent from the number and type of significantly contribution variables the amount of explained variance ranged from 8% in paranoid ideation to 39% in obsessive compulsion. In multiple regression analyses, with SCL-90-R scores from the completion of university training as dependent variables and the respective SCL-90-R, temperament and character scores from entry into training as independent variables, no
significant model based on the stepwise method could be found for phobic anxiety. The proportion of the variation of the response variable (SCL-90-R in 2\textsuperscript{nd} assessment) that is explained by the explanatory variables is provided as adjusted $r$-square. The larger the value of adjusted $r$-square, the better the set of explanatory variables predicts response variable. For example variation in somatic symptoms at first assessment can explain 18\% of variance in somatic symptoms of the 2\textsuperscript{nd} assessment. The unexplained percentage of 82\% could be explained by variation in not measured variables and measurement errors. However, the variance of the independent variables from the first assessment could explain substantial variance in the other SCL-90-R scores from the completion of training—between 13\% (psychoticism from the second assessment by psychoticism from the first assessment) and 42\% (somatic symptoms from the second assessment by anxiety, hostility, and somatic symptoms from the first assessment), with harm avoidance as the personality characteristic that often significantly contributed to the findings (for obsessive-compulsive, interpersonal sensitivity, depression, anxiety, and hostility, see Table 4).

### Table 4: Multiple regression with personality domains from 1st assessment as independent variables and SCL-90-R scores from 2nd assessment as dependent variables (N=52)

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Independent variables from 1\textsuperscript{st} assessment</th>
<th>Adjusted $r^{2}$</th>
<th>$F$ (r\textsuperscript{2}change)</th>
<th>$P$ (r\textsuperscript{2}change)</th>
<th>Standardized $\beta$</th>
<th>t score</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatic symptoms</td>
<td>somatic symptoms</td>
<td>0.18</td>
<td>11.87</td>
<td>0.001</td>
<td>0.44</td>
<td>3.45</td>
<td>0.001</td>
</tr>
<tr>
<td>Obsessive compulsion</td>
<td>Obsessive compulsion</td>
<td>0.26</td>
<td>18.17</td>
<td>&lt; 0.001</td>
<td>0.23</td>
<td>1.52</td>
<td>0.135</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td></td>
<td>0.31</td>
<td>5.15</td>
<td>0.028</td>
<td>0.38</td>
<td>2.59</td>
<td>0.013</td>
</tr>
<tr>
<td>Cooperativeness</td>
<td></td>
<td>0.39</td>
<td>6.55</td>
<td>0.014</td>
<td>-0.28</td>
<td>-2.56</td>
<td>0.014</td>
</tr>
<tr>
<td>Interpersonal sensitivity</td>
<td>Interpersonal sensitivity</td>
<td>0.06</td>
<td>4.41</td>
<td>0.041</td>
<td>0.12</td>
<td>0.87</td>
<td>0.380</td>
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<tr>
<td>Depression</td>
<td>Depression</td>
<td>0.16</td>
<td>10.40</td>
<td>0.002</td>
<td>0.05</td>
<td>0.37</td>
<td>0.071</td>
</tr>
<tr>
<td>Harm Avoidance</td>
<td></td>
<td>0.31</td>
<td>11.36</td>
<td>0.001</td>
<td>0.38</td>
<td>2.76</td>
<td>0.008</td>
</tr>
<tr>
<td>Self Directedness</td>
<td></td>
<td>0.36</td>
<td>4.92</td>
<td>0.031</td>
<td>-0.31</td>
<td>-2.21</td>
<td>0.031</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Anxiety</td>
<td>0.13</td>
<td>8.76</td>
<td>0.005</td>
<td>0.09</td>
<td>0.59</td>
<td>0.560</td>
</tr>
<tr>
<td>Hostility</td>
<td>Hostility</td>
<td>0.23</td>
<td>7.05</td>
<td>0.011</td>
<td>0.44</td>
<td>2.66</td>
<td>0.010</td>
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<tr>
<td>Paranoia</td>
<td>Cooperativeness</td>
<td>0.08</td>
<td>5.29</td>
<td>0.026</td>
<td>-0.31</td>
<td>-2.30</td>
<td>0.026</td>
</tr>
<tr>
<td>Psychoticism</td>
<td>Psychoticism</td>
<td>0.13</td>
<td>8.30</td>
<td>0.006</td>
<td>0.38</td>
<td>2.88</td>
<td>0.006</td>
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</table>
The variance in corresponding SCL-90-R scores from the first assessment alone could explain between 6% (interpersonal sensitivity) and 26% (obsessive-compulsive) of the variance in the scores from the second assessment. The variance in harm avoidance, the only significant temperament score from the first assessment remaining in the regression equation could explain substantial amount of variance in five of the psychopathological scores (SCL-90-R subscales) from the second assessment: obsessive compulsive, anxiety, interpersonal sensitivity, depression and hostility. This means students with higher harm avoidance, experience higher level of obsessive compulsive, anxiety, interpersonal sensitivity, depression and hostility. Whereas variance in character scores only explained an additional amount beyond the SCL-90-R from first assessment and the harm avoidance score for depression (-self-directedness explained 5%) and obsessive-compulsive (-cooperativeness explained 7%). This means on top of baseline harm avoidance and SCL-90-R, self-directedness explained depression at 2nd assessment additional 5% and cooperativeness explained obsessive compulsive symptoms additional 7%.

The changes in personality characteristics between the two assessments have been significantly correlated with changes in psychopathological symptoms and with changes in character scores self-directedness (negative – highest with psychoticism, r=–0.38) and self-transcendence (positive – highest with anxiety, r=+0.52). Changes in self-directedness were significantly negative associated with changes in five of the nine SCL-90-R scores (obsessive compulsive (r=–0.33), depression (r=–0.28), anxiety (r=–0.32), hostility (r=–0.28) and psychoticism (r=–0.38). This means students with improved self-directedness at second assessment experience less mental health symptoms, compare to their baseline status. Substantial positive associations were observed for changes in self transcendence with regard to changes in four of nine SCL-90-R scores (depression: r=+32, anxiety: r=+0.52, hostility r=+0.35, phobic anxiety r=+0.38). Changes in self-directedness and self transcendence were the most important, as indicated by their substantial associations with changes in five and four, respectively, of the nine SCL-90-R scores. Changes in harm avoidance were significantly positively associated with four subscales – highest with somatic symptoms and psychoticism), novelty seeking (negatively associated with obsessive-compulsive and phobic anxiety) and cooperativeness (negatively associated with hostility and phobic anxiety when theoretically predicting a substantial association. However, changes in reward dependence and persistence did not significantly relate to changes in any of the SCL-90-R scales (see Table 5).
Table 5: Spearman rank correlation coefficients between changes in personality domain scores and changes in SCL-90-R scores in the two-years follow-up (N=52)

<table>
<thead>
<tr>
<th></th>
<th>Novelty Seeking</th>
<th>Harm Avoidance</th>
<th>Reward Dependence</th>
<th>Persistence</th>
<th>Self Directedness</th>
<th>Cooperativeness</th>
<th>Self Transcendence</th>
</tr>
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<tr>
<td>Somatic symptoms</td>
<td>-0.29†</td>
<td>0.38**</td>
<td>0.02</td>
<td>-0.22</td>
<td>-0.09</td>
<td>0.07</td>
<td>0.22</td>
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<td>Obsessive compulsive</td>
<td>-0.34*</td>
<td>0.32*</td>
<td>0.07</td>
<td>0.11</td>
<td>-0.33*</td>
<td>0.03</td>
<td>0.22</td>
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<td>Interpersonal Sensitivity</td>
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<td>0.18</td>
<td>0.07</td>
<td>-0.05</td>
<td>-0.27†</td>
<td>-0.15</td>
<td>0.26†</td>
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<tr>
<td>Depression</td>
<td>-0.14</td>
<td>0.13</td>
<td>0.20</td>
<td>0.05</td>
<td>-0.28*</td>
<td>-0.06</td>
<td>0.32*</td>
</tr>
<tr>
<td>Anxiety</td>
<td>-0.08</td>
<td>0.31*</td>
<td>0.10</td>
<td>-0.10</td>
<td>-0.32*</td>
<td>0.0011</td>
<td>0.52**</td>
</tr>
<tr>
<td>Hostility</td>
<td>-0.20</td>
<td>-0.07</td>
<td>-0.01</td>
<td>0.06</td>
<td>-0.28*</td>
<td>-0.24†</td>
<td>0.35*</td>
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<tr>
<td>Phobic Anxiety</td>
<td>-0.34*</td>
<td>0.13</td>
<td>-0.06</td>
<td>0.08</td>
<td>-0.19</td>
<td>-0.25†</td>
<td>0.38**</td>
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<tr>
<td>Paranoid Ideation</td>
<td>-0.12</td>
<td>0.14</td>
<td>0.25†</td>
<td>0.02</td>
<td>-0.10</td>
<td>-0.19</td>
<td>0.25†</td>
</tr>
<tr>
<td>Psychoticism</td>
<td>-0.07</td>
<td>0.34*</td>
<td>0.05</td>
<td>-0.03</td>
<td>-0.38**</td>
<td>-0.07</td>
<td>0.24†</td>
</tr>
</tbody>
</table>

† p ≤ 0.05 level (1-tailed); * p ≤ 0.05 level (2-tailed); ** p ≤ 0.01 level (2-tailed).

DISCUSSION

In our present study, changes in personality characteristics and general health among Swedish police trainees were investigated in the course of their two-year university training. Furthermore, we analyzed time-lagged relationships between personality characteristics and mental health and the associations between changes in personality characteristics and changes in mental health during this period.

Our findings indicate that there is a tendency towards a small reduction in one temperament dimension, novelty seeking (mainly based on a reduction in subscale 2: impulsiveness versus reflection), and a more substantial reduction in self transcendence (mainly due to a reduction in subscale 1: self-forgetfulness). Seemingly, Swedish police trainees learned to focus on long-term goals and to act with somewhat more appropriate levels of deliberation, which often may be useful in their daily practices when they are trying to keep calm, even in difficult situations, to help them make thoughtful decisions. These findings might indicate a slightly increased reflective capacity of the police trainees, which represents one of the core issues in police training.

Therefore, increased self-insight and social learning processes might trigger and inform such changes (Caspi & Roberts, 2001). One other explanation to such changes might depend on task oriented training as problem based learning pedagogical modules. Police trainee’s take part of number of complex situations where they have to act, organize and cope with stress. One example between many of such a complex training module is a scenario where police trainee has to carry on a report on a car accident and in the same time get calm angry people and also protect people meanwhile keep in contact with the communication central.

Our results confirm associations between different scores for the personality characteristics and the psychopathological syndrome scores of the SCL-90-R with regard to the
impact of several temperament and character traits on a wide spectrum of psychopathological syndromes, thereby confirming previous findings (Conrad, Geiser, Kleiman, Zur, & Karpawitz-Godt, 2014; du Preez et al., 2011). Harm avoidance and self-directedness have been found to be the most closely related (positively and negatively, respectively) to a wide spectrum of psychopathological symptoms, confirming many findings from previous research (Rettew & McKee, 2005). As these associations could even be established in a sample of very healthy and highly mature individuals (substantially lower SCL-90-R scores and higher self-directedness and cooperativeness scores as indicators of maturity compared with individuals from the Swedish general population; see Ghazinour et al., 2010), we suggest that these relationships can be described as universal given their independence from an individual’s level of psychopathology or maturity.

Furthermore, self-transcendence decreased over the course of police training, mainly because of a decrease in the subscale ST1 (self-forgetfulness versus self-consciousness). Through police training and its intensive focus on facts and analysis, police trainees’ creative minds moved along this dimension, and they tended to be more aware of their individuality or concentrating on their work (Cloninger et al., 1994). Possibly, the combination of being lectured by skilled police officers; the training in self-awareness as well as improving self-confidence, and mindfulness techniques might have contributed to the found differences in personality characteristics, psychopathological symptoms and associations between both constructs over time. However, most personality characteristics and psychopathological symptoms are seemingly stable and rather unchanged. This can be due to the highly selected participants in terms of highly mature and healthy individuals who decided for a police officer career. Alternatively, the theoretical assumption of the trait-like nature of personality characteristic in Cloninger’s personality theory might have been confirmed by the results. Additionally, the relative short follow-up period of two years might represent another reason for the found relative stability of most scores.

Several limitations of our present investigation have a negative impact on the generalizability and interpretability of the findings. The very small sample size and its high retention rate between the two assessments indicate this study’s explorative character, which was the main reason that corrections were not applied for multiple comparisons in the data analysis. Another limitation is the study’s exclusive use of self-report questionnaires. However, the use of internationally established assessment methods provides the opportunity for a wide range of comparisons between our results and other findings in the literature. The sample can be criticized for not being adequately representative to analyze the relationships between personality and psychopathological phenomena. Interestingly, representativeness does not usually occur when investigating such associations in clinical populations. We claim that the use of a sample from the other ‘positive’ end of psychopathological symptoms, combined with mature personality characteristics, provided us the opportunity to make conclusions regarding the generalizability of these associations across humankind.

The recruitment of police trainees based on a rigorous selection criteria and also our findings might provide evidence for the fact that police officers burn out and stress are much due to the line of the duty. This observation addresses previous assumption about police personality.

Despite a number of methodological limitations, we conclude that, over the course of two years, police trainees’ personality characteristics have shown some minor changes that
seemingly fit the demands of policing and are potentially valuable with regard to the trainees’ future careers. Personality characteristics are predictors of mental health even in a highly selected sample of mature and healthy individuals like Swedish police trainees.

Conflicts of interest
The authors have no conflicts of interest to declare.

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