Bachelor Thesis

Psychometric Evaluation of the Dutch Brief Resilience Scale (BRS-NL): A Correlational Survey Design

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June 2016

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Acknowledgements

I would like to use this opportunity to express my gratitude to all people who supported me in the process of writing this bachelor thesis.

First and foremost I would like to thank my first supervisor Prof. Dr. Karlein Schreurs for providing excellent guidance and insight during the process of writing this research paper. Besides my first supervisor, I would also like to express my gratitude to my second supervisor Dr. Hester Trompetter for her valuable input in the final stage of the writing process, which helped me to look at the thesis from a slightly different angle and thus to improve my work. I would like to thank them for their constructive feedback and the stimulating discussions that I had with them, which finally pushed me to go beyond my limits.

My sincere thanks also go to Dr. Remko Soer, from the Saxion University of Applied Sciences, who provided me with the opportunity to use the data from their extensive study. He could answer all my questions relating the study, which came up during the writing process of this paper.

Furthermore, I am grateful for all the support from my friends, who shared their expertise, sincere and valuable guidance and who give me encouragement.

Finally, I would like to express my deepest gratitude to my family: my parents for their unconditional love, encouragement and for teaching me that I can achieve anything as long as I work hard enough for it; my brother and sister for supporting me mentally; my boyfriend for his unconditional love and for his consistent support, patience and caring not only during my work on this thesis, but also during the whole bachelor program.

This accomplishment would not have been possible without them.

Thank you.

Sarah Katharina Zimmermann

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Abstract

Background: Resilience has a great influence on all people's lives and also plays an important role for the working environment. Permanent work absenteeism can be avoided by intervening as early as possible. For this purpose a practical efficient screening instrument which measures resilience is needed. There is a special demand for a validated screening instrument in the Netherlands, since such an instrument does not exist yet. Therefore the aim of this study was to carry out a psychometric evaluation of the BRS-NL, the Dutch version of the Brief Resilience Scale.

Methods: A correlational survey design was used. Employees from a Dutch concern (N = 107; 10% female and 90% male) voluntarily participated in this study. To investigate the psychometric properties of the BRS-NL, the factor structure, reliability, concurrent validity and construct validity of the BRS-NL were explored. For estimating the validity of the scale, correlations between potentially related constructs and resilience were analyzed with the aid of Pearson Correlation analyses.

Results: The BRS-NL is a screening instrument with an acceptable reliability, especially concerning the internal consistency of the scale (Cronbach's α .74). However, the current results of the study rather question the validity of the scale. Both, the concurrent validity and the construct validity could not fully be established within this study.

Conclusion: Altogether, the analysis of the psychometric properties of the BRS-NL is not finished yet. Before this scale can be used in practice, some adaptations should be done and the psychometric characteristics must be analyzed more extensively.

Keywords: resilience · Brief Resilience Scale · BRS-NL

Samenvatting (Dutch Abstract)

Achtergrond: Veerkracht heeft grote invloed op het leven van alle mensen en speelt ook een belangrijke rol in de werkomgeving. Langere werkverzuim kan worden voorkomen door zo vroeg mogelijk te interveniëren. Hiertoe is een praktisch efficiënt screening instrument nodig dat veerkracht kan meten. Aangezien er tot nu toe nog geen dergelijk instrument bestaat, is er een behoefte aan een gevalideerd screening instrument in Nederland. Het doel van deze studie was daarom het uitvoeren van een psychometrische evaluatie van de Korte Veerkracht Vragenlijst (BRS-NL), de Nederlandse versie van de Brief Resilience Scale.

Methoden: In deze studie werd een corrationeel survey design gehanteerd. Medewerkers van een Nederlandse bedrijf (N = 107; 10% vrouwen en 90% mannen) namen op vrijwillige basis deel aan dit onderzoek. Om de psychometrische eigenschappen van de BRS-NL te achterhalen werden de factor structuur, betrouwbaarheid, concurrente validiteit en construct validiteit nader onderzocht. Voor het beoordelen van de validiteit van de schaal werden correlaties tussen veerkracht en andere waarschijnlijk gerelateerde constructen geanalyseerd door middel van Pearson Correlaties.

Resultaten: De BRS-NL is een screening instrument met een aanvaardbare betrouwbaarheid, in het bijzonder met betrekking tot de interne consistentie van de schaal (Cronbach's alpha .74). Echter is de validiteit van de BRS-NL op basis van de resultaten van deze studie nogal twijfelachtig. Zowel de concurrente validiteit als ook de construct validiteit waren slechts deels vast te stellen.

Conclusie: Al met al bleek dat de analyse van de psychometrische eigenschappen van de BRS-NL nog niet is voltooid. Er dienen enkele aanpassingen worden gedaan voordat dit instrument kan worden gebruikt in de praktijk. Ook moeten de psychometrische eigenschappen nog uitgebreider worden geanalyseerd.

With the beginning of the 21st century a paradigm shift in the mental health care from a problem-oriented approach to one of nurturing strengths and positive qualities called "Positive Psychology" has started (Seligman & Csikszentmihalyi, 2000). Stepwise, psychologists reached the perception that mental health embodied much more than the absence of mental illnesses (Seligman & Csikszentmihalyi, 2000). The past has also shown that working exclusively on personal weaknesses and on impaired brains was poorly effective in preventing illness (Seligman & Csikszentmihalyi, 2000). With this new view, people were no longer seen as passive individuals who were determined by their circumstances but rather as active individuals, who were able to create their life as they desired (Seligman & Csikszentmihalyi, 2000). Today, psychology is more focused on prevention of mental illnesses and does not just concentrate on healing those (Seligman & Csikszentmihalyi, 2000).

One fundamental subject of research within Positive Psychology has been the aspect of noticeable individual differences in how people react and cope with highly aversive events. Even while the half of all adults in the world experience at least one traumatic event during their lifetime, not all adults develop clinical psychopathology after those events (Ozer et al., 2003; Shalev et al., 1998). Research has shown that some people can cope effectively with these events, whereas others cannot. One factor which was found to be strongly connected with this is resilience (Windle, Bennett, & Noyes, 2011).

According to Zautra, Arewasikporn and Davis (2010), *resilience* can be best defined as adaptive responses to adversity, containing three components, namely *recovery, sustainability* and *growth*. Recovery means the individual's ability to emotionally bounce back from stressful events or adversity (Wagnild, 2003; Zautra et al., 2010), which occurs due to the individuals' inborn desire to physiologically return to homeostasis with the aid of the parasympathetic nervous system (Zautra et al., 2010). While the sympathetic nervous system is engaged in arousal, the parasympathetic nervous system strives to bring the individual back to baseline (Zautra et al., 2010). Sustainability refers to maintaining purposeful living, which includes keeping up values and goals, while coping with challenges of acute and chronic difficulties (Zautra, 2009; Zautra et al., 2010). However, resilience may also contain growth (Zautra et al., 2010). Overcoming highly traumatic or stressful events, like natural disasters or severe diseases, enables some individuals to make their lives seem more meaningful and to grow emotionally (Helgeson, Reynolds, & Tomich, 2006).

Resilience was also observable within developmental psychology. Substantial attention was obtained since researchers discovered that children and youth could cope and adapt, although they experienced adversity (Ahern, Ark, & Byers, 2008). The study of

Manning, Carr and Kail (2014) has discovered resilience as a notable factor that can protect against the negative impact of disability in later life.

There are many diverse opinions on the characteristics of resilience. Researchers like Ahern, Ark and Byers (2008) suggest "empirical evidence indicates that resilience is dynamic, developmental in nature and interactive with one's environment" (p. 1). This means that resilience is maybe not static, but changeable. Whereas researchers like Portzky, Wagnild, De Bacquer and Audenaert (2010) declare that "there is still some debate whether resilience is a fixed, stable personality trait with a strong genetic influence, or a dynamic process that can start at any given moment in life, or even a mix between the two" (p.86). Furthermore, factors which seem to contribute to resilience of a person could be found (Ozbay et al., 2007). Some of these solid predictors of resilience were a raise of income, positive social support and absence of chronic disease, for instance (Bonnano, Galea, Bucciarelli, & Vlahov, 2007). Apparently, it is not totally clear how resilience arises, but studies suggest that male gender is associated with a raised likelihood of resilience and moreover older people are more likely to be resilient than younger people (Bonnano et al., 2007).

Resilience is also of great importance for the working environment. Although studies show less resilient people could also recover from an aversive event, these individuals are greatly affected in their level of functioning during the recovery process (Mancini & Bonanno, 2006). In contrast, more resilient people show only short-dated reactions and are able to maintain their level of functioning in such situations (Mancini & Bonanno, 2006, 2009). Moreover, adversity can effect that an individual gets more and more into a swirl of negative thoughts and feelings (Portzky et al., 2010). In severe cases, that can lead to depression, or in the worst case to suicide (Portzky et al., 2010). Hence, it can be very interesting for employers to determine the individual level of resilience of their employees and thus be able to intervene in certain instances (Portzky et al., 2010).

For this purpose, a screening instrument with good psychometric properties, which also meets the requirements of the employers, is needed. The screening instrument should be very brief, but effective. There are many different scales to measure resilience, such as the Dutch version of the Resilience Scale for instance, validated by Portzky et al. (2010). Disadvantages of this scale are the consistence of 25 items, thereby, it is time consuming and consequently not suitable as screening instrument for employers. Together with a few other reviewed scales, the research of Windle et al. (2011) on fifteen different resilience scales has identified the Brief Resilience Scale (BRS) generated by Smith et al. (2008) as one with the

best psychometric ratings on several quality criteria. This scale meets the requirements of the employers because it is short and also validated (Windle et al., 2011).

The reasons mentioned above show that there is also a special demand for a validated Dutch version of the BRS in the Netherlands. In the past, there was one trial by Leontjevas, de Beek, Lataster and Jacobs (2014) to create and validate a Dutch version of the BRS, the *BRSnl*. These authors translated the original English version of the BRS into Dutch and also retranslated it into English. This version was, however, not officially translated and consequently not confirmed by the author of the original BRS (Smith et al., 2008). For this reason, the Saxion University of Applied Science in Enschede, the Netherlands, has officially translated the original BRS into Dutch and also retranslated it into English, recently. Furthermore, they obtained confirmation of the Dutch version of the BRS (BRS-NL) from Smith et al., who created the BRS.

Accordingly, the purpose of this study is to validate this new, official version of the BRS-NL and also to determine the reliability and the validity of the BRS-NL to get a proper screening instrument for the working environment. Therefore, the underlying research question of this research paper is: *Is the BRS-NL a reliable and valid screening instrument to measure resilience?*

To answer this question the factor-structure, reliability, concurrent validity and construct validity of the BRS-NL were analyzed in the current study. The construct validity could be estimated by testing relations between resilience, measured by the BRS-NL and other constructs. Different constructs seem to be correlated to resilience based on literature, including work engagement, physical activity, smoking, alcohol use, diet, relaxation and heart-rate-variability-measures to name a few. To test the concurrent (criterion) validity of the BRS-NL, it was necessary to have other well established measuring procedures which determine constructs that are presumably related to resilience, such as vigor. One of these measuring procedure is the Utrechtse Bevlogenheidsschaal (UBES), generated by Schaufeli and Bakker (2003).

The UBES-9 measures *work engagement* and consists of three underlying constructs, namely *vigor*, *dedication* and *absorption*. According to Schaufeli, Bakker and Salanova (2006)

> engagement refers to a more persistent and pervasive affective-cognitive state that is not focused on any particular object, event, individual, or behavior. Vigor is characterized by high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of

> difficulties. Dedication refers to being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge. Finally, absorption is characterized by being fully concentrated and happily engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work. (p.702)

A study of Bakker, Gierveld and Van Rijswijk (2006) indicates that female school principals with most personal resources had the highest scores on work engagement. It is proven that resilience is one of the essential factors to explain unique variance in engagement scores (Bakker, Gierveld, & van Rijswijk, 2006). Bakker, Schaufeli, Leiter and Taris (2008) argued from that that resilience can be seen as personal resource that may facilitate work engagement, thus resilience seems to be a predictive factor for the construct work engagement. On this account, it is hypothesized that there is a moderate positive relation between *resilience* measured by the BRS-NL and *work engagement* measured by the UBES-9.

Furthermore, it is supposed that there is a moderate positive relation between *resilience* measured by the BRS-NL and *vigor* measured by the UBES-9. This is because vigor is characterized by Schaufeli et al. (2006) as well as by Strijk et al. (2015) as a construct which consists of three main dimensions: energy, motivation and resilience. That means that resilience and vigor overlap to some extent. Therefore, vigor should be correlated with resilience. In this regard the concurrent validity of the BRS-NL can be tested.

Literature has shown that lifestyle factors are also correlated with resilience. The BRAVO-factors (*Beweging, Roken, Alcohol, Voeding* and *Ontspanning*) measure lifestyle behavior like physical activity, smoking, alcohol, diet and relaxation. For employers it can be interesting to know how lifestyle behavior of their employees is correlated with their level of resilience. Research suggests a significant relation of resilience with several lifestyle factors.

While observing several animal species, researchers found out that physical activity could be one protective factor for mental health by increasing resilience to stress via regulation of the stress response (Hegberg & Tone, 2015). In this study of Hegberg and Tone, a significant and positive association between physical activity and self-perceived resilience among individuals with high trait anxiety has been discovered. This phenomenon does not occur among individuals with low and moderate trait anxiety though (Hegberg & Tone, 2015). In addition, research of Stein et al. (2007) indicates that physical activity affects physiological changes, which are crucial mediators of psychopathology and resilience in return. Gerber et al. (2012) reported that persons who fulfill the recommend physical activity

have increased mental toughness scores compared to those who did not fulfill these recommendations. From this literature, it can be deduced that physical activity and resilience are positively related. For this reason, it is assumed that there is a moderate positive relation between *resilience* measured by the BRS-NL and *physical activity* measured by the lifestyle-questionnaire.

Beside this expected connection between physical activity and resilience, literature has also shown that resilience seems to be negatively associated with smoking. Research of Valeska et al. (2009) indicates that highly resilient people are less likely to start smoking. This fact has also been underlined by other research of Skrove, Romundstad and Indredavik (2013), which indicates that individuals have shown to be more resilient when they have not smoked during the previous month. Consequently, a high smoking score on the lifestyle-questionnaire seems to be negatively correlated with resilience. On this account, it is hypothesized that that there is a moderate negative connection between *resilience* measured by the BRS-NL and *smoking* measured by the lifestyle-questionnaire.

A study of Green, Beckham, Youssef and Elbogen (2014), which was carried out on US Iraq and Afghanistan era veterans, discovered that high levels of psychological resilience were negatively related to alcohol abuse and, furthermore, protective against alcohol abuse over time. Accordingly, it was found that higher levels of resilience were correlated with reduced problem alcohol drinking rates (Green et al., 2014). Also the study of Sepehri-Shamloo and Cox (2010) among alcohol abusers shows that resilience was negatively correlated with substance abuse. For this reason, it is assumed that there is a moderate negative relation between *resilience* measured by the BRS-NL and *alcohol* measured by the lifestyle-questionnaire.

To this day there is little knowledge about the relation between resilience and diet, since there are no scientific findings in regard. However, literature has shown that greater resilience demands physical health (Schure, Odden, & Goins, 2013). A healthy diet is also one factor that contributes to physical health (Sorgdrager, van Vliet, & van Mechelen, 2006) and thereby possibly correlates with resilience. On this account, it is assumed that there is a weak positive connection between *resilience* measured by the BRS-NL and *diet* measured by the lifestyle-questionnaire.

In a study among urban inhabitants, Buchecker and Degenhardt (2015) found that regular nearby outdoor recreation was significant but rather marginal correlated with respondents' announced well-being and their level of psychological resilience. Similar relations were discovered with other leisure activities. However, the study also indicates that a

long duration of recreation or leisure activities was required for increasing psychological resilience (Buchecker & Degenhardt, 2015). For this reason, it is hypothesized that there is a weak to moderate positive relation between *resilience* measured by the BRS-NL and *relaxation* measured by the lifestyle-questionnaire.

Till now there was only less research on the relation between *resilience* and *heart-rate-variability* (HRV). HRV can be described as the heart's complex rhythms, which is the naturally occurring beat-to-beat variation of the heart rate (McCraty & Shaffer, 2015). This variation is a physiological phenomenon and simultaneously an indicator of the balance in sympathetic and parasympathetic nervous system activity, which occurs because of the inputs of the parasympathetic and sympathetic nervous system (McCraty & Shaffer, 2015). The sympathetic nervous system is activated when an individual is exposed to stress, whereby the heart begins to beat faster (McCraty & Shaffer, 2015). Contrary, the parasympathetic nervous system strives to bring the individual's heartbeat back to baseline (McCraty & Shaffer, 2015). This is exactly the same process of *recovery* which is described by Zautra and colleagues (2010). Deductive HRV can be seen as good indicator of recovery, which happens to be a component of resilience.

Usually, when measuring the average heart rate, no attention is paid to these beat-to-beat variations (McCraty & Shaffer, 2015). HRV is composed of different measures, which can be divided in two groups, namely time domain and frequency domain (McCraty & Shaffer, 2015). Some studies have shown that HRV seems to be strongly correlated with resilience. Beauchaine (2001) noted that HRV provides a sign of psychological resilience. Other studies discovered that an optimal level of HRV within an individual displays a sign of healthy function and resilience of a person (McCraty & Shaffer, 2015). In the current study, it should be controlled if there are also relations between certain HRV-measures and resilience within this study, to figure out if HRV-measures are possibly useful screening instruments for employers.

According to this literature research, it seems to be obvious that different constructs are related with resilience. To estimate the unique contributions of the different constructs on resilience a multiple regression analysis was also done in the course of this study.

As mentioned before, besides conducting this multiple regression analysis, also the psychometric properties of the BRS-NL, including factor structure, reliability and validity, were investigated. The study hypotheses referring to the validity of the scale, on the basis of theory and previous studies of resilience, can be summarized as follows:

H1: There is a moderate positive correlation between *resilience* and *work engagement*.

H2: There is a moderate positive correlation between *resilience* and *vigor*.

H3: There is a moderate positive correlation between *resilience* and *physical activity*.

H4: There is a moderate negative correlation between *resilience* and *smoking*.

H5: There is a moderate negative correlation between *resilience* and *alcohol*.

H6: There is a weak positive correlation between *resilience* and *diet*.

H7: There is a weak to moderate positive correlation between *resilience* and *relaxation*.

H8: There are weak correlations between *resilience* and certain HRV-measures.

Methods

Design

In this study, a correlational survey design was used.

Ethical Considerations

The Medical Ethical Committee of the University Medical Center Groningen and the Institutional Review Board of the Saxion University of Applied Sciences gave permission to carry out this study.

Sample

Employees from a Dutch concern (N = 107; 10% female and 90% male) ranging in age from 22 to 64 (M = 49.75, SD = 8.84 years) voluntarily participated in this study. More detailed demographic characteristics of the sample are presented in Table 1. Inclusion criteria were that participants were healthy, employed at the participating company and able to speak Dutch, because the questionnaires were administered in Dutch. Data was collected over a period of two months. In this study, informed consent was obtained from all participants.

Table 1

Participant Characteristics (N = 107)

Characteristic	*n*	%
Education		
WO	9	8.41
HBO	35	32.71
MBO	45	42.06
HAVO-VWO	2	1.87
VMBO	16	14.95
Employment Status		
Permanent	106	99.07
Temporary	1	0.93
Work Hours		
Regular	87	81.31
Irregular	20	18.69

Procedure

The data of the questionnaires and the HRV-measures were collected within the framework of a workers' health surveillance. This annual health-check was carried out by a Dutch organization which supports organizations by optimizing health, enduring applicability, growth and progress. Login-codes were sent to the employees of the company via e-mail, so that the questionnaires could be filled in by the respondents at home. Biometric measures (e.g., cholesterol, glucose, BMI, HRV-measures) were collected within the annual health-check at the companies.

In this study, participation was voluntary and data was collected via a web application. Initially, respondents received an informed consent and general information about the study. After this respondents had to answer demographic questions and furthermore questions about their work situation (e.g., position within the company, employment status). Subsequently, respondents received information about the questionnaires and the topics of the questionnaires, respectively followed by a short instruction about how to fill in the answers.

The employers could not see the data of single employees. It was possible for the employees to receive an evaluation of their data. Employers only obtained an anonymous evaluation of the whole analysis.

Materials

Within an annual health-check, data of many different questionnaires and biometric measures were collected. In this study, only the data of the BRS-NL, UBES-9, lifestyle questionnaire and heart-rate-variability were of special interest and are subsequently described in more detail.

BRS-NL. The Dutch version of the 6-item Brief Resilience Scale (BRS-NL) measures the degree of individual resilience (see Appendix A). The items of this self-report questionnaire are scored on a 5-point Likert scale from 1 = *sterk mee oneens* (strongly disagree) to 5 = *zeer mee eens* (strongly agree). Item 1, item 3 and item 5 are positively worded (e.g., "Na een moelijke periode veer ik meestal gemakkelijk weer terug."), whereas item 2, item 4 and item 6 are negatively worded (e.g., "Het kost me meestal veel tijd om over tegenslagen in mijn leven heen te komen."). The BRS-NL is scored by reverse coding items 2, 4 and 6 and finding the mean of the six items. Possible scores are ranging from 1 to 5. A higher score corresponds to being more resilient than a lower score (Smith et al., 2008).

The original Brief Resilience Scale (BRS), generated by Smith et al. (2008) has a good internal consistency with Cronbach's α ranging from .81 to .91. In addition, the study of Smith et al. (2008) noted a good test-retest reliability of .69 for one month and .62 for three months. Finally, a one-factor structure was discovered for the BRS, with loadings ranging from .68 to .91 (Smith et al., 2008).

UBES-9. The shortened version of the Utrechtse Bevlogenheids Schaal (UBES) is a self-report questionnaire and consists of 9 items. The whole scale measures *work engagement* and the three subscales reflect the three dimensions corresponding to work engagement, namely *vigor*, *dedication* and *absorption*, each measured with three items.

The scale measuring *vigor* is characterized as having a lot of energy and (psychological) resilience, feeling strong and fit, not tiring easily, and going ahead if things go badly. The *dedication* scale is marked by enthusiasm, inspiration, pride, challenge and satisfaction. The scale measuring *absorption* is characterized by being happily involved in one's work and fully concentrated, whereby time passes fast and one has difficulties to disengaging oneself from work.

Items are scored on a 7-point Likert scale from 0 = *nooit* (never) to 6 = *altijd* (always). All items are positively worded (e.g., "Op mijn werk bruis ik van energie."). The UBES-9 is scored dividing the sumscore by the number of items concerning the subscale, respectively

the whole scale. Scores are ranging from 0 to 6. A higher score corresponds to having more *vigor*, *dedication* or *absorption* as well as respectively more *work engagement* than a lower score.

The UBES-9 has encouraging psychometric qualities. Confirmative factor analysis indicates that the UBES-9 has a three-factor structure (Schaufeli & Bakker, 2004). But research also indicated that a total score can be used in practice. Furthermore, studies have shown that the three dimensions of work engagement are highly interrelated with correlations that are normally higher than .70. The internal consistency (Cronbach's α) ranges typically from .79 to .89 (Schaufeli & Bakker, 2004). In this study, only the whole scale, measuring work engagement, and one subscale, namely the vigor scale, were of special interest. The Cronbach's α for work engagement was .94 and for the vigor scale .88 in this study.

Lifestyle questionnaire (Leefstijlvragenlijst). The BRAVO-factors were measured by a lifestyle questionnaire in the current study. This questionnaire is variable as well as non-validated, but the BRAVO-factors are used by many organizations in the Netherlands (e.g., Sportcentrum Overijssel, Nederlands Instituut voor Sport en Bewegen). The aim of this questionnaire was to evaluate the lifestyle of the respondents.

The questionnaire originally contains 72 questions about different lifestyle behavior in total. 22 Items correspond to the topic physical activity, 14 items are about smoking behavior, 11 items deal with alcohol consumption, 15 items ask about the diet and 10 items treat to recreation.

However, only 17 items were taken into the final analysis during conduction of this study, since not all items were relevant. All answers were linked with values, which were summed up afterwards in order to eventually have one total score for every construct. These total scores could easily be interpreted afterwards. By linking values to the answers, attention has been paid to general guidelines (see Appendix B). For physical activity 2 items were summed up, three items for smoking, two items for alcohol, six items for diet, and for relaxation four items were summed up. The Cronbach's alpha for the composed physical activity scale was .69, for the smoking scale .78, for the alcohol scale .89, for the diet scale .35 and for the relaxation scale .65. Since the internal consistency for the diet scale was unacceptable, this scale has not been taken into further analyses.

emWave-pro technology. The HRV-measures of this study were collected by using the commercially available product *emWave-pro* by HeartMath®. This technology allows observing the heart's changing rhythms in real time with the aid of an infrared pulse

plethysmograph (PPG) ear sensor. The PPG is a light-based technology used to sense the rate of blood pressure as controlled by the heart's pumping action (Allen, 2007).

In this study, both a one-minute-measure and a five-minute-measure of every participant were collected. The one-minute-measure can be described as a six-breath-measurement, which means that the participant has to take six deep breaths within one minute so that the maximum HRV-range (amplitude) can be assessed, whereas the five-minute-measure contains that the individual breaths normally during five minutes.

PPG was used in this study because it is very complicated to use the widely available electrocardiography (ECG) method by which electrodes are placed on the patient's body. In a study of Lu, Yang, Taylor and Stein (2009), it was observed that the PPG technique forms a practical alternative to ECG for HRV-analysis, because PPG provides accurate interpulse intervals from which HRV-measures can be accurately derived. Furthermore, a pilot study of Bolanos, Nazeran and Haltiwanger (2006) has shown that the correlation coefficients of the HRV-measures between ECG and PPG were approximately 1.

In this study, the following HRV-measures were used: The Low Frequency Band (LF), which is a band of power spectrum ranging between 0.04 Hz and 0.15 Hz, reflects both sympathetic and parasympathetic activity; the High Frequency Band (HF), which is a band of power spectrum ranging between 0.15 Hz to 0.4 Hz, reflects parasympathetic activity; the Total Power (TP), which is a short-term estimate of the total power of power spectral density in the range of frequencies between 0 and 0.4 Hz; the Intervals, which describe the number of intervals between heartbeats in the measured period; the Mean Heart Rate Range (MHRR), which is the mean difference between the maximum and minimum heart rate for a certain time period; the Beats-per-minute (BPM), which measures the contractions of the heart per minute, therefore the speed of the heartbeat; the Standard Deviation of Normal-to-Normal (SDNN), which is a marker for how the overall nervous system is functioning compared to the average; the Root Mean Square of Successive Differences (RMSSD), which is a measure of parasympathetic generated activity and the Respiratory Rate (RR), which refers to the number of breaths for a certain time period.

Statistical analysis

Data preparation. The researcher was offered only relevant data for the current study by the Saxion University of Applied Sciences. The researcher got the data summed up in an Excel-file. Data has been transformed into the statistic program Statistical Package for Social

Sciences (SPSS), version 22 and subsequently analyzed with the help of this program. Negative worded items were reversed and total scores of different constructs were calculated as new variable. Data was screened for normal distribution and outliers with help of a histogram and a box plot.

Missing values. Cases with missing values (n = 8) were excluded. Data of these eight respondents was not missing systematically referring to gender. After these persons have been removed from the study, 99 participants remained. There were two reasons for this decision. The first reason was that the researchers thought it could be confusing for the reader if the sample size changed in nearly all analyses of this study. The second and most important reason for this decision was that a multiple regression analysis should be done in the end, in which only complete cases were to be included. The inclusion criterions for the multiple regression analysis were the previous significant Pearson Correlation coefficients. In order to avoid possible changes in significant values due to changes in the sample size, all incomplete data was excluded from all analyses right from the beginning.

Factor analysis. At the beginning, an exploratory factor analysis was used to determine if the BRS-NL maintained the one-factor structure of the BRS (Smith et al., 2008). Prior to this, the factorability of the sample was tested with several criteria (Bühner, 2006). To find out if the sample was factorable, the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and Bartlett's Test of Sphericity were examined. To evaluate the sample factorable, the KMO should be at least .5 and the Bartlett's Test of Sphericity should be significant. To decide if all six items could be included in the factor analysis the diagonals of the anti-image correlation matrix should be > .5. At last, the communalities were considered to estimate if each item shared some common variance with the other items, therefore the communalities should be ideally > .5 (Bühner, 2006). The significance of factor loadings depends on the sample size and for a sample size of 100 the loadings should be greater than .512 (Field, 2013).

Reliability. To determine the internal consistency of the BRS-NL Cronbach's alpha (α) was estimated. Cronbach's α reliability coefficient ranges between 0 and 1. The closer Cronbach's alpha is to 1, the greater is the internal consistency of the items in the scale (Gliem & Gliem, 2003). According to George and Mallery (2003) Cronbach's α > .9 is *excellent*, between .9 and .8 can be described as *good*, between .8 and .7 is *acceptable*, between .7 and .6 is *questionable*, between .6 and .5 is *poor* and everything < .5 is

unacceptable. Gliem and Gliem (2003) stated that a Cronbach's alpha of .8 is a reasonable goal.

Concurrent validity. To evaluate the concurrent validity of the BRS-NL a Pearson Correlation analysis with resilience and vigor was conducted in this study. Since the existence of a moderate correlation between both constructs has been hypothesized, the correlation coefficient (r) was expected to lie between .32 and .5, with a significance level of < .05 (Taylor, 1990).

Construct validity. To assess the construct validity of the BRS-NL Pearson correlation analyses were used. Correlation coefficients were estimated with resilience and other constructs, namely work engagement, lifestyle behavior and HRV-parameters. According to Luteijn and Barelds (2013) a correlation < .32 can be evaluated as *weak*, a correlation between .32 and .5 can be interpreted as *moderate* and a correlation > .5 can be graded *strong*. The significance level was < .05.

Multiple regression analysis. A multiple regression analysis was done with the aim to find out to which extent the constructs uniquely contributed to resilience (i.e., score on the BRS-NL). The enter method was used in this study, which means that all independent variables were entered into the equation at the same time. Resilience was the dependent variable, whereas constructs with significant correlations were respectively the independent variables. Person correlation analyses between the different constructs and resilience were run first to discover the constructs with significant correlations ($p < .05$).

Results

Factor Analysis

The minimum amount of data for factor analysis was satisfied, with a final sample of 99, with over 16 cases per item. The Kaiser-Meyer-Olkin measure of sampling adequacy was .78 and Bartlett's Test of Sphericity was significant (χ^2 (15) = 155.16; $p < .001$). Furthermore the diagonals of the anti-image correlation matrix were all over .5. At last, the communalities were all above .5. Given these overall indicators, factor analysis was conducted with all six items.

The initial eigenvalues of the total variance analysis are presented in Table 2. The first factor with an eigenvalue of 2.79 explained 47% of the variance and the second factor explained 19% of the variance with an eigenvalue of 1.13. This means that the variance could be considerably elevated up to 65% with the second factor. The scree plot depicted in Figure 1 offers ambiguous results. A possible one-factor structure could be detected, if looking at the point of inflection, but concurrently, a two-factor structure referring to the Kaiser criterion could be found.

Table 2

Eigenvalues and Percentages of Explained Variance Associated With Each Factor

	Initial Eigenvalues		
Factor	Total	% of Variance	Cumulative %
1	2.79	46.56	46.56
2	1.13	18.75	65.31
3	.73	12.13	77.43
4	.57	9.54	86.97
5	.45	7.45	94.42
6	.34	5.58	100.00

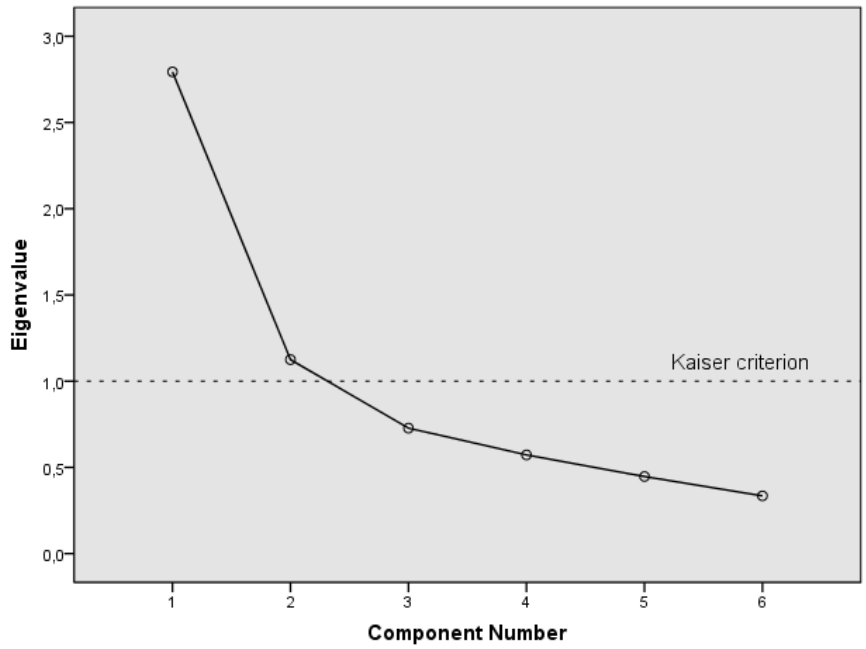

Figure 1. Scree Plot of the Factor Analysis

The component matrix is given in Table 3. It shows that five of six items loaded high on the first factor with loadings ranging from .56 to .82. However, the first item loaded lower on the first factor with a loading of .42, but high on the second factor with a loading of.70.

Table 3

Loading Matrix of the Principal Component Analysis (PCA)

	Factor	
	1	2
Na een moelijke periode veer ik meestal gemakkelijk weer terug.	.42	**.70**
Ik vind het moeilijk om me door stressvolle gebeurtenissen heen te slaan.	**.71**	.22
Het kost me niet veel tijd om te herstellen van een stressvolle gebeurtenis.	**.56**	.48
Ik vind het moeilijk om het snel van me af te schudden als er iets ergs is gebeurd.	**.68**	-.48
Ik sla meestal redelijk probleemloos door moeilijke periodes heen.	**.82**	-.16
Het kost me meestal veel tijd om over tegenslagen in mijn leven heen te komen.	**.81**	-.32

Note: Factorloadings > .52 appear in bold.

Internal Consistency

The reliability analysis revealed that Cronbach's α for the 6-item BRS-NL was acceptable with a value of .74. As can be seen in Table 4, item-total correlations ranged from .30 to .64. The reliability coefficient did not increase more than .05 when any of the individual items were deleted. With deleting the first item, Cronbach's alpha increased only marginal to .76. Therefore, it was chosen to take all items into the following analysis.

Table 4

Item-Total Statistics of the BRS-NL

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Na een moelijke periode veer ik meestal gemakkelijk weer terug.	17.13	9.69	.31	.76

Ik vind het moeilijk om me door stressvolle gebeurtenissen heen te slaan.	17.17	8.61	.55	.69
Het kost me niet veel tijd om te herstellen van een stressvolle gebeurtenis.	17.43	9.29	.42	.73
Ik vind het moeilijk om het snel van me af te schudden als er iets ergs is gebeurd.	17.41	9.55	.45	.72
Ik sla meestal redelijk probleemloos door moeilijke periodes heen.	17.12	9.15	.64	.67
Het kost me meestal veel tijd om over tegenslagen in mijn leven heen te komen.	17.01	9.15	.61	.68

Resilience and Vigor

A Pearson product-moment correlation coefficient was computed to assess the relationship between the level of resilience ($M = 3.44$, $SD = 0.59$) and the level of vigor ($M = 4.27$, $SD = 0.96$) of a person. The result of the Pearson's r test is presented in Table 5 and shows a statistically significant correlation between *resilience* and *vigor* ($p < .001$). Overall, there was a moderate, positive correlation between resilience and vigor, indicating that higher levels of resilience corresponded with higher levels of vigor.

Resilience and Other Constructs

Idem Pearson product-moment correlation coefficients were also computed to assess the relationships between the level of *resilience* and *work engagement* ($M = 4.27$, $SD = 0.89$), *physical activity* ($M = 5.02$, $SD = 3.49$), *smoking* ($M = .74$, $SD = 1.08$), *alcohol* ($M = 1.76$, $SD = 0.82$) and *relaxation* ($M = 6.00$, $SD = 1.81$). As can be seen in Table 5, there were positive correlations between all variables and resilience, except for smoking and alcohol. However, statistically significant correlations were only found between *resilience* and *work engagement* ($p = .002$) and between *resilience* and *relaxation* ($p = .01$). Overall, there was a weak, positive correlation between resilience and work engagement, and a weak positive correlation between resilience and relaxation.

Table 5

Pearson Product-Moment Correlations with Resilience of Vigor, Work Engagement and Lifestyle Factors (N = 99)

		Vigor	Work engagement	Physical acitivity	Smoking	Alcohol	Relaxation
Resilience	*r*	**.36**	**.31**	.08	-.11	-.05	**.26**
	p	<.001	.002	.459	.301	.651	.010

Note: Significant correlations appear in bold.

Furthermore, coefficients were computed to assess the relationships between resilience and the HRV-measures, including the LF, HF, TP, Intervals, MHRR, BPM, SDNN, RMSSD and RR for the one-minute-measure and the five-minute-measure, respectively. One-minute-measures of the LF, HF and TP did not exist. As can be seen in Table 6, overall, no significant correlations were found between *resilience* and the different HRV-measures ($p > .05$).

Table 6

Pearson Product-Moment Correlations Between Resilience and HRV-Measures (N = 99)

		One-minute measure								
		LF	HF	TP	Intervals	MHRR	BPM	SDNN	RMSSD	RR
Resilience	*r*	–	–	–	.13	.08	.12	-.02	.02	-.12
	p	–	–	–	.204	.426	.228	.863	.826	.259
		Five-minute measure								
		LF	HF	TP	Intervals	MHRR	BPM	SDNN	RMSSD	RR
Resilience	*r*	.11	.09	.15	-.08	.09	-.05	.12	.11	.08
	p	.280	.405	.144	.463	.381	.649	.231	.292	.407

Note. Data which is not reported is symbolized with a dash. *LF* = Low frequency band. *HF* = High frequency band. *TP* = Total Power. *MHRR* = Mean Heart Rate Range. *BPM* = Beats-per-minute. *SDNN* = Standard Deviation of Normal-to-Normal. *RMSSD* = Root Mean Square of Successive Differences. *RR* = Respiratory Rate.

Multiple Regression Analysis

Three variables evidenced significant correlations with resilience, namely *vigor*, *work engagement* and *relaxation*. With these variables, a multiple regression analysis was run to predict the dependent variable *resilience* (i.e., score on the BRS-NL). The results of the

multiple regression analysis are presented in Table 7. Together the independent variables statistically significantly predicted *resilience* ($F(3, 95) = 5.84$; $p = .001$, $R^2 = .16$).

Table 7

Multiple Regression Analysis (ANOVA)

Model		*SS*	*df*	*MS*	*F*	*p*
1	Regression	5.37	3	1.79	5.84	.001[b]
	Residual	29.09	95	.31		
	Total	34.45	98			

Note. SS = Sum of Squares. *df* = degrees of freedom. *MS* = Mean Square.

[a] Dependent Variable: resilience

[b] Predictors: (Constant), relaxation, work engagement, vigor

But as can be seen in Table 8 no single construct added statistically significantly to the prediction ($p > .05$). That means that no predictor was uniquely related to the criterion (resilience) after controlling for all other predictors in the model.

Table 8

Coefficients of the Multiple Regression Analysis

		Unstandardized Coefficients		Standardized Coefficients			95 % CI for B	
Model		B	*SE*	Beta	t	*p*	Lower Bound	Upper Bound
1	(Constant)	2.34	.30		7.78	.000	1.74	2.93
	Vigor	.24	.15	.39	1.65	.103	-.05	.54
	Work engagement	-.06	.16	-.09	-.38	.706	-.37	.25
	Relaxation	.05	.03	.16	1.66	.100	.01	.12

Note. CI = confidence interval. *SE* = Standard error.

[a] Dependent Variable: resilience

Discussion

Main Findings

The purpose of this study was to test the psychometric properties of the Dutch version of the BRS. Overall, it became apparent that the BRS-NL is a screening instrument with an

acceptable reliability, especially concerning the internal consistency of the scale. However, the current results of the study show that the validity of the scale is rather questionable. Both, the concurrent (criterion) validity and construct validity could not fully be established within this study. Thereby, the results are partially similar with the findings of the original BRS (cf., Smith et al., 2008).

All in all, two of eight hypotheses were corroborated. Hypothesis H2 was verified because a moderate positive correlation between resilience and vigor could be discovered. Hereby, the concurrent validity of the BRS-NL could be established to some extent, since vigor exists partly of resilience. Hypothesis H7 could also be corroborated because a weak positive correlation between resilience and relaxation could be identified in this study. Hypothesis H1 could not be fully verified, since only a weak positive correlation could be discovered between resilience and work engagement, instead of an expected moderate correlation. Contrary to the formulated hypotheses H3, H4, H5 and H8, stating existing correlations between resilience and physical activity, smoking, alcohol and certain HRV-measures, the predicted correlations could not be detected within this study. Hence, the construct validity of the BRS-NL could not be fully established.

Contrary to the study of Smith et al. (2008), the factor analysis did not provide definite results over the structure of the BRS-NL. The results suggested a possible one-factor-structure or two-factor-structure. These ambiguous results required further qualitative analysis. By taking a closer look to the content of the items, it emerged that Item 1 (“Na een moeilijke periode veer ik meestal gemakkelijk weer terug”) and Item 3 (“Het kost me niet veel tijd om te herstellen van een stressvolle gebeurtenis”) had nearly the same content and the same meaning. The only difference between these two items was the verbalization. The formulation of the first item contains the verb *terugveren*, whereas in the third item the verb *herstellen* is used. Although both verbs mean *recover*, the two items had different factor loadings. Considering that the first item was the only one which factor loadings pointed on a two-factor-solution, it is possible that the second factor is presumably artificial, since this item did not differentiate from the content of the other items. Researchers of this study also assume that *terugveren* is either no common mode of expression in the Netherlands in the used context or that the word is not understood by everyone.

The variance, which is explained only by the first factor, is already reasonable, but somewhat lower than the proportion explained variance in the study of Smith et al. (2008). The reliability of the scale is acceptable, but the Cronbach’s alpha is marginally lower than the Cronbach’s alpha in the study of Smith et al. (2008).

To sum it all up, it is expected that these marginal differences in findings between the study of Smith et al. (2008) and the present study were all caused by the first item. There are multiple options to work these differences out. One option is to rephrase the first item. If the first item would slightly be changed though, it could be very likely for the second factor to disappear. Furthermore it is expected that the variance as well as the reliability would rise. Another option is to completely remove the first item from the scale, because the results would probably be more similar regarding the factor structure. Ultimately, it is recommended to rephrase the first item, since the BRS-NL still is a new screening instrument. Therefore it is important that the reliability of the scale becomes more solid through the rephrased first item.

Relating to the research question of this paper, it is important to mention that the BRS-NL consists only of items which asked for the recovery of a person. This fact became apparent during the qualitative analysis of the scale. The BRS-NL thus only measures one aspect of resilience and does not see it as one large construct, since sustainability and growth are not measured by this scale (Zautra, 2009). If the scale remains the way it is it would be beneficial if the scale was renamed, so that it is obvious what the scale actually measures. The current name of the scale leads the user astray, because the name pretends that resilience as a whole will be measured with the BRS-NL. Otherwise the manual of the BRS-NL should be adjusted so that it became clear that the scale only measures recovery and not resilience.

Although these formal aspects can simply be added, it would be much better if the BRS-NL was somewhat more broadened so that it ultimately measured the aspects of resilience all at once. The current version is not of great value for research and the society, since strictly speaking the scale only measures, if people have the subjective perception that they possess the ability to recover. This knowledge might be valuable in situations which include specific stressors, while examining if someone is able to recover. However, it is not useful when other stressors such as chronic diseases appear, since in those cases sustainability and growth would be more convenable. Therefore the BRS-NL has only a limited application at the moment.

Since some people cannot recover due to chronic illness, it is much more important to measure their level of sustainability to estimate if they are able to manage life situations, because this ability forms a big part of resilience, as well. Therefore questions which ask for the sustainability and growth of a person have to be added. To give an example, these questions should contain, whether a person is still able to maintain a purposeful life and does things he or she wants to do, while coping with challenges of acute or chronic difficulties (Zautra, 2009; Zautra et al. 2010). Furthermore, to also implement growth in the BRS-NL, it

should be asked whether people are able to give their lives a meaning and emotionally develop following stressors (Helgeson et al., 2006).

Beside these recommendations for an adaptation of the BRS-NL, this study has also investigated correlations between resilience and other constructs. Correlations between vigor as well as work engagement and resilience could expectedly be discovered within this study, since these constructs are related with resilience. These findings are in accordance with other studies (cf. Bakker et al., 2006), but the correlations between resilience and these constructs were found to be only small.

Correlations between resilience and different HRV-parameters could not be found in this study, although other studies stated a strong correlation between HRV and resilience (cf., Beauchaine, 2001; McCraty & Shaffner, 2015). A possible explanation for this could be that, in this study, resilience has been measured in two different forms. On the one hand it has been measured on a subjective level by letting the respondents fill in the BRS-NL self report questionnaire. On the other hand it has been measured on an objective, physiological level by HRV-measures. Although it is expected that both measuring procedures will highly correlate with each other since both measure resilience, this does not necessarily have to be the case. While the body signalizes that a person is resilient, because it has an appropriate variable heart rate for instance, the person must not necessarily have the perception that he or she is resilient. Many other studies have detected only small correlations between self-report measures and objective measures, as well (cf., Bastien, Vallières, & Morin, 2001; Weaver, Kapur, & Yueh, 2004). High correlations of these measures are therefore an erroneous belief.

Another explanation for not finding correlations in the current study is that it has only been tested for a linear relation of HRV-parameters and resilience. Since HRV is very complex, it is not easy to define what a *good* HRV should contain. An extreme high or an extreme low value has not necessarily to be a *good* value. It is even possible that a *good* value lies in between. If such *norm values* would be identified, it was more possible that correlations are found.

Contrary to prior literature, correlations between resilience and the constructs physical activity, smoking and alcohol could not be discovered in this study (cf., Hegberg & Tone, 2015; Sepehri-Shamloo & Cox, 2010; Valeska et al., 2009). Possibly different definitions of resilience, which were used in the diverse studies, are able to provide an explanation for the different results (cf., Luthar, Cicchetti, & Becker, 2000). Since there is no common underlying theoretical construct and no consistent, prevailed definition for resilience, it remains difficult to compare results of resilience-studies.

It is furthermore possible that not finding significant correlations between those constructs and resilience was caused by the characteristics of these constructs and their operationalizations. While resilience seems to be a trait, which is relative stable over time, constructs like physical activity are contextual and more likely to fluctuate over time. Thereby it is not surprising that it is more difficult to find correlations between those constructs.

It was very striking that relaxation was the only lifestyle factor which correlated with resilience in this study. Looking at these two constructs with regards to content the correlation between both is even logical. The extent to which someone can come to rest at home, thus relax, is closely linked with the ability to recover from stress or to *bounce back*.

It is likely that the explanation for finding only weak correlations, or rather finding no correlations at all, lies in the conceptualization of resilience. As has been stated before, this is also in compliance with Zautra et al. (2010), who declared that resilience contains not only one construct, but is multidimensional.

Limitations and Strengths

There are several limitations of this study. Firstly, the sample of this study was not representative for the working population, because, on the one hand, the average age was nearly fifty years, which is quite high, and on the other hand, the sample consisted almost exclusively of men. Hence it is possible that the results would differentiate if the sample was more even. Since, in one of their studies, Bonnano et al. (2007) discovered that the prevalence of resilience was notably predicted by participant age and gender.

Secondly, some of the used questionnaires were susceptible to socially desirable answers (cf., DeMaio, 1984). The answers of the lifestyle questionnaire should be interpreted with caution, since it is asked for many private themes. It is likely that the respondents faced a conflict between answering candidly and the desire to appear to be in the socially desirable category. Although the employees were informed that their data were treated confidential, it cannot be excluded that employees feel controlled by their employers to a certain extend.

Lastly, as discussed before, in the current study it has only been tested for linear relations between HRV-parameters and resilience, since there is still a lack of *norm values* for short term HRV-parameters (cf., Nunan, Sanderdock, & Brodie, 2010). It is possible that correlations between certain HRV-parameters and resilience could be discovered, if *norm values* were taken into account.

Despite these shortcomings this study contains several strengths. First of all, the study only has a few missing values, which means that nearly all respondents filled in all

questionnaires. This is impressive because a large number of questionnaires were used in this study. It seems that the amount was adequate, since the respondents' motivation to fill in the questionnaires lasted till the end. Thereby, it was possible to collect much information of the respondents, which proved to be beneficial to receive a rather detailed picture of their personality.

Secondly, four of the self-constructed scales of lifestyle behavior, namely the physical activity scale, smoking scale, alcohol scale and relaxation scale, had adequate values for the internal consistency, with values ranging from .65 to .89. Furthermore, the current study was helpful for employers, because, based on these results, it emerged that HRV-measures are no suitable screening instruments to estimate the resilience of a person.

Suggestions for Further Research

Recommendations for future research include an adjusted formulation of the first item and a subsequently rerun of the factor analysis to ascertain if the second factor was about to disappear. If this does not become apparent, the characteristic of the second factor should be reconsidered.

Furthermore, validated instruments should be used in future research to calculate the lifestyle of a person more precisely. A third recommendation is to estimate the psychometric quality of the BRS-NL more extensively. Therefore a second scale, which measures resilience and which is already validated should be part of the study to judge the concurrent validity more precisely. This could be the Dutch version of the Resilience Scale, validated by Portzky et al. (2010) for instance.

Moreover, it is advised to conduct a retest of the BRS-NL in future research to estimate the test-retest-reliability of the scale. This would contribute to a more complete appraisal of the reliability of the BRS-NL. Finally, a sample should be employed in further research with equivalent of male and female respondents and a more heterogeneous age to receive a more representative sample of the working population. As mentioned before, this is of great importance, since the well-known diversities in men and women as well as in the respondents' age alter the level of resilience.

Conclusion

All in all, the current study is valuable for further research on resilience, because the study called attention to a special demand for a validated screening instrument to assess resilience in the Netherlands. If the definition of Zautra et al. (2010) on resilience is valid, it can be said

that the BRS-NL is a suitable instrument to measure one aspect of resilience, namely recovery. However, it became clear that it is necessary to measure more constructs to get a more complete picture of the resilience of a person.

The current study can be seen as a first step for analyzing the psychometric properties of the BRS-NL, but it became apparent that the analysis of the psychometric properties is not finished yet. Before this scale can be used in practice some adaptations should be done and the psychometric characteristics must be analyzed more extensively.

This study has shown that resilience, or rather recovery, is not only linked with the ability to recover from stress but also with the ability to come to rest at home. Therefore it is possible that relaxation is a resilience resource. Furthermore vigor has been found to be moderately correlated with resilience. Maybe the conceptualization of resilience has to be broadened by taking more of possible resources into account. It is important to identify other constructs that have influence on resilience to understand this construct more complete.

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Appendix A

Korte Veerkracht Vragenlijst (Nederlandse vertaling[1], WMC Six Dijkstra, 2015)

Graag aangeven in hoeverre u het eens bent met de volgende stellingen, maak daarbij gebruik van de volgende schaal:

1 = sterk mee oneens, 2= mee oneens, 3 = neutraal, 4 = mee eens, 5 = zeer mee eens

1. Na een moeilijke periode veer ik meestal gemakkelijk weer terug.	1	2	3	4	5
2. Ik vind het moeilijk om me door stressvolle gebeurtenissen heen te slaan. (R)	1	2	3	4	5
3. Het kost me niet veel tijd om te herstellen van een stressvolle gebeurtenis.	1	2	3	4	5
4. Ik vind het moeilijk om het snel van me af te schudden als er iets ergs is gebeurd. (R)	1	2	3	4	5
5. Ik sla me meestal redelijk probleemloos door moeilijke periodes heen.	1	2	3	4	5
6. Het kost me meestal veel tijd om over tegenslagen in mijn leven heen te komen. (R)	1	2	3	4	5

[1] Brief Resilience Scale, Smith et al, 2008

Appendix B

General guidelines for scoring of BRAVO-factors

Guidelines assume a minimum of 30 minutes of daily physical activity (Pate et al., 1995; van Binsbergen, 2007). For this reason answers which include that the respondents do a minimum of 30 minutes of daily physical activity got high scores, whereas answers which include less or no physical activity got low scores. Scores were ranging from 0 to 14. The higher the score the more physically active had been the respondent.

The scores linked to the smoking items were selected so that it is possible to divide into groups: nonsmokers, past-smokers, light-smokers, normal-smokers and heavy-smokers. Scores are ranging from 0 to 5.

According to van Binsbergen (2007) woman should not drink more than seven glasses of alcohol and men should not drink more than 14 glasses of alcohol per week. Scores were linked to the answers so that it can be differentiated between respondents who drink less than 15 glasses, 15-25 glasses, 26-50 glasses or more than 50 glasses of alcohol per week. Scores were ranging from 0 to 5.

Furthermore guidelines dictate that a healthy diet includes eating approximately 200 gram vegetables, 200 gram fruits, and fish two times per week (van Binsbergen, 2007). Accordingly, scores were linked to the answers so that respondents got a high total score in the end if they ate healthy. Scores were ranging from 0 to 10.

Relaxation answers were treated in the same way. Scores were linked to the answers so that a high total score in the end means that the respondent is capable of relaxing sufficiently. Scores were ranging from 0 to 9.