Master thesis

Mediating role of Authenticity between Signature Strengths Intervention and Career Decision Making Self-Efficacy for graduates

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Word count: 8495

Year of graduation: 2021/2022

Abstract

This current study investigated the effect of an online signature strengths intervention (SSI) on graduates' career decision-making self-efficacy (CDMSE) and whether this was mediated by authenticity. CDMSE was defined as an individuals' expectation relating to ones' skill to successfully execute a given task and behavior that is crucial for controlling the process of career decision making. This construct was measured by the Career Decision-Making Self-Efficacy-Short Form (CDMSE-SF). Authenticity was defined as the capacity to be and feel ones' whole self. This construct was measured by the Authenticity scale (AS). A field experiment was conducted with 46 participants which were randomly assigned to a passive waitlist control condition or had to participate in a 3-week signature strengths intervention. This study hypothesized that SSI leads to more authenticity, which in turn, will increase the level of CDMSE of graduates. For the mediating analysis, PROCESS Macro was used to test the hypothesized relationships. The results showed that there is no direct effect between SSI and CDMSE. However, results showed there was a full mediating effect of authenticity. Concluding, authenticity is found to be an crucial mechanism in the relationship between SSI and CDMSE. In accordance with these findings, a number of options for future research, limitations and practical implications are discussed.

Keywords: signature strengths intervention, authenticity, career decision-making self-efficacy, graduates, mediation

Introduction

"If I have the believe I can do it, I shall surely acquire the capacity to do it even if I may not have it at the beginning." — *Mahatma Gandhi*

Today's work pressure and choice for future graduates is increasing. This can cause confusion, insecurity, chaos and stress, making them no longer aware of their strengths and self-efficacy to make the right decision in their career development. Despite the well-known fact that the demand for graduates continues to rise, most graduate students do not participate in career decision activities until their final graduation period. In addition, a significant group of graduate students experience difficulties in the process of planning and making career choices and experience a feeling of insecurity in finding their starting job (Jin et al., 2009).

The positive quote above can be used to explain the concept of self-efficacy of an individual in a work context. Taylor and Betz (1983) were the first to study the concept of self-efficacy in work context; **Career Decision Making Self-Efficacy (CDMSE)**, an individuals' expectation relating to ones' skill to successfully execute a given task and behaviour that is crucial for controlling the process of career decision making. In their study they generated the Career Decision Making Self-Efficacy Scale (CDMSES) to scale a individuals' self-efficacy expectancy as it applies at first hand to the career decision making behaviour and tasks (Taylor & Betz, 1983). This scale consists of five subscales: Self-Appraisal, Occupational Information, Goal Selection, Planning, and Problem Solving. The items included on the scale were obtained from Crites' Affective aspect of career adulthood and evaluation of ones' attitude to the career decision making process (Luzzo, 1993).

In previous studies on CDMSE, researchers have focused on how CDMSE is positively linked to aspects like educational outcomes, life contentment and career adjustment (Vela et al., 2018; Betz & Luzzo, 1996). Therefore, they began to identify factors that influence CDMSE, because of the positive connection to career adjustment and management, educational outcomes and mental health. For example, in the study of Brown et al. (2003), the findings showed a considerable relation among high levels in CDMSE and better occupational dedication amongst American university students. Another example of such a factor is positive psychology interventions; activities or treatments aimed at developing a person's cognitions, behaviors or positive feelings (Proyer et al., 2015), which have come to the attention of researchers where they acknowledge concepts like educational achievement, positive psychological functioning and results of progress in ones' career.

In addition, several studies have shown that using interventions for specific character strengths can improve self-efficacy. For example, researchers showed that signature-strengths interventions have a positive influence on aspects such as: educational performance (Duckworth et al., 2007), open to new career opportunities and educational success (Vela et al., 2018; Littman-Ovadia et al., 2016). Despite the few findings, the effect of the usage of these specific character strengths have not been studied yet for the concept of CDMSE for graduates (Meyers et al., 2015; van Woerkom & Meyers, 2019; Weber et al., 2013).

These strengths interventions help to develop and identify the specific character strengths which helps to discover ones' true self at the level of authenticity (Medlock , 2012). According to Peterson and Seligman (2004) are ones' signature strengths most related to the concept of authenticity. In the research of White & Tracey (2011) it is discussed how a component of authenticity made authenticity connected to career decision. In addition, Russon & Schmidt (2014) stated that CDMSE can be positively influenced by the role of the

awareness part of authenticity. This means that authenticity can also influence the level of CDMSE in addition to signature-strength interventions.

However, a few studies have provided findings of the usage of signature-strengths and the associated desired outcomes, there is still relatively little research done on what the influence of signature-strengths interventions are on the level of career decision-making self-efficacy for graduates, and if this influence possibly is mediated by authenticity.

The purpose of the present study aims to gain more insight into individuals' CDMSE by comparing different conditions then have been studied before. This research aims to broaden the literature on how, for graduates, signature-strengths interventions may influence their CDMSE by taking the mediating effect of authenticity into account. This will be done by comparing the benefits of participating in a signature-strengths intervention in the work context to a waiting-list control group, to study the effects on CDMSE for graduates and see if this is influenced by the mediating effects of authenticity. In this regard, would ones' CDMSE when participating in a signature-strengths intervention increase, decrease, or remain the same compared to be in a waiting-list control group? And is this mediated by authenticity? In conclusion, the following research question is directed:

Is there an effect of signature-strengths interventions on graduates' Career Decision Making Self-Efficacy, and is this relationship mediated by authenticity?

This study brings relevant knowledge to the literature on signature interventions in different contexts and seeks to complement and improve the previous findings. In addition, although several researchers have examined signature-strengths interventions in multiple ways (e.g. educational achievement), this has never been studied for the graduate group and for the possible mediating effect of authenticity. This literature will be completed by

examining the effects of participation in signature-strengths interventions on graduates' CDMSE, when authenticity is taken into account.

From a practical point of view, the findings of the signature-strengths intervention research and their effects on CDMSE may be relevant to certain individuals, such as university graduates and job-starters, within the current context of the pandemic. In those times of the pandemic, graduates may have been effected, after which CDMSE feelings, awareness of their signature character strengths and authenticity may be affected. This can add valuable information to the practice.

Signature strengths and CDMSE

Because of the positive psychology standard, researchers apprehend how character strengths make contributions to ones' positive psychological functioning and career development (Vela et al., 2018). **Character strengths** can be explained as the way they affect our behavior, thinking, feeling and positive experiences (Pezirkianidis & Stalikas, 2020). The strengths are also associated with being and getting the best out of ourselves and redirecting us on to the right path to do the things that are best (Pezirkianidis & Stalikas, 2020). These character strengths apply as stable individual attributes over time and according to cross-cultural research, the existence of one's strengths has been shown to hold around the world over time (Park et al. 2006). Peterson and Seligman (2004) developed a study where 24 character strengths and six universal virtues had been assessed and categorized, also known as the Values-in-Action (VIA)-classification. The criteria to include a strength in the classification was the importance to have a beneficial input to individual fulfilment (Proyer et al., 2015).

According to several studies, character strengths are positively related to work outcomes (Littman-Ovadia et al., 2016), self-esteem (Proctor et al., 2011), career adaptability (Lee & Kim, 2018) and teachers self-efficacy (Lim & Kim, 2014). Career adaptability is

described as self-regulating strengths which contribute towards the self-management and optimism in career context (McLennan et al., 2017; Savickas & Porfeli, 2012). Research suggests that improvement of career adaptability is related to future career-related tasks, interest in exploring multiple versions of ones' self and their career chances and taking on profession demanding situations for accomplishing achievements of their vocational tasks (Savickas, 2005). According to McIlveen et al. (2016) career adaptability is connected to self-efficacy what collectively affect ones' work engagement.

Each individual has strengths that are the most prominent for them, the so called **Signature Strengths** (Peterson and Seligman 2004). According to Seligman (2002) are recognition and the usage of your signature strengths a crucial basis for growing in all aspects of life. Work is one of the aspects considered to be an important part in life because it holds opportunities for individuals' flourishing and where the benefits of using ones' signature-strengths can be transferred and used in different populations (Peterson and Park 2006; Littman-Ovadia et al. 2017; Lounsbury et al. 2009; Proctor et al. 2011). For example, the results of Schutte & Malouff's (2018) study showed that improved use of signature strengths are related to increased self-efficacy (Proctor et al. 2010; Proyer et al. 2013), better progression in achieving goals (Linley et al. 2010), improvement on work performance and work satisfaction and greater academic performance (Lounsbury et al. 2009). Furthermore, in the study of Littman-Ovadia et al. (2016) the findings indicated that the use of individuals' their signature-strengths has a positive influence on organizational level through improvement of goal-directed behaviours and performance. According to the study by Vela et al. (2018), two character strengths were found to be predictive of higher CDMSE, namely grit and curiosity. The results of this study showed that as the level of the two strengths improve, the level of CDMSE increases. Also important were optimism and gratitude, where high

levels of optimism and gratitude could work in a way where students are confident enough to pursue new directions in the work environment (Vela et al., 2018).

Despite the fact that the connection between the use of VIA's strengths at work and character strengths on self-efficacy is investigated, the role of signature strengths and CDMSE among students (job starters & graduates) has not been sufficiently explored. There have only been a few studies that attempted to study the specific benefits of using signature-strengths to ones' flourishing at work and the positive connection with aspects (e.g. work engagement, self-efficacy) that influence CDMSE. Mostly, this is compared to the other kinds of strength interventions and not to a waiting-list control group. Research is necessary to determine what effect signature-strengths interventions have on CDMSE compared to a waiting-list control group.

Following the previously mentioned studies, this study expects to find results that are congruent to the findings that already have been found. Therefore, the following hypothesis is formulated:

Hypotheses 1: Participation in a signature-strengths intervention has a significant positive effect on ones' CDMSE, compared to being in a waiting-list control group.

Little is still known about the mechanisms underlying the relationship between signature strengths and CDMSE. However, several studies have suggested that a mediating mechanism like authenticity can be found in aspects of the self (Borawski, 2019). Authenticity can be described as the capacity to be and feel ones' whole self (internal or personal) (Benoit et al., 2017). According to the study of Kernis and Goldman (2006), authenticity exists out of four elements, namely *awareness*, *unbiased processing*, *authentic behavior* and *relational orientation*. The *awareness* component can be described as understanding and repeatedly exploration of personal strengths, weaknesses, stimulation,

desires and feelings. *Unbiased processing* could be interpreted as unbiased regarding personal strengths and weaknesses without cognitive distortions (e.g., defensiveness and self-serving biases) (Borawski, 2019). *Authentic behavior* refers to congruence in ones' values, actions and needs. For example, people who show low levels of authentic behavior would seek to only please other people's needs instead of theirs. And last, *relational orientation* mentions back to the interpersonal facet of authenticity in which the point of interest is on openness, honesty, sincerity and truthfulness in their close relationships.

Signature Strengths and Authenticity

According to Peterson and Seligman (2004), positive psychology emphasizes the point that the use of strength interventions are closely related to authenticity. So results authentic happiness from recognizing strengths, trying to acquire them and apply them on a daily basis (Peterson and Seligman, 2004; Seligman, 2002). Keeping in mind that strengths play a important role to ones' actual self and can empower people to get the best out of their selves in their work environment (Van Woerkom et al., 2016), It is believed that the use of strengths promote authenticity (Matsuo, 2020). In addition, the theory of the strengths approach found that identifying ones' strengths and the usage of them can make people more hopeful to achieve the goals they set (Snyder et al., 2002) and have acquired more positive emotions to increase personal resources, what contributes to being more authentic (Fredrickson, 2001).

According to research of Medlock (2012) virtues and strengths such as courage, open-mindedness, openness to experience, social intelligence and many more, all contain components of a fully expressed ethic of authenticity. Other results suggested that individuals undergo a sense of authenticity when they make use of their signature strengths (Medlock, 2012). This can be explained by the way how individuals identify their signature strengths. The outcome of this process is leading to people finding out who they are from their inside level of authenticity. For example, Seligman (2002) described people who work on and

improve their strengths and talents as "authentic happy individuals". Furthermore, in other research he and Peterson recognized authenticity as one of the elements of signature strengths where they described the strength as " *a sense of ownership and authenticity (the real me)*" (Medlock, 2012). Seligman further explains that the Values in Action (VIA) Signature Strengths questionnaire functions as a tool to help individuals develop and find their real self.

Based on the theoretical background and its findings, the following hypothesis has been formulated:

Hypotheses 2: Participation in a signature-strengths intervention will have a significant positive effect on the participants' feeling of authenticity, compared to a wait-list control group.

Authenticity & CDMSE

Following several studies, strengths from authenticity facilitate awareness for the self (Riggle et. al, 2008). For example, in the research of White & Tracey (2011) the self-awareness component made authenticity connected to career decision making. This could be seen as essential for the conceptualization of authenticity. In addition, CDMSE can be positively influenced by the role of the awareness part of authenticity (Russon & Schmidt, 2014).

Furthermore, another component of authenticity is found to be important for career decision making, namely self-knowledge (White & Tracey, 2011). Research by Brown & Lent (2008) showed that self-knowledge and occupational information are part of decision-making. This was in accordance with other research that was found, where authenticity can promote social learning and self-knowledge, which is critical for obtaining CDMSE (Zhang et al., 2019). In addition, an authentic individual would be better able to find a career environment that fits his/her self's needs because they pick an environment that is appropriate and behave in line with their true selves (Schmader & Sedikides, 2017).

By looking more specifically at the concept of self-efficacy in career decision-making, a higher level of control over CDMSE can be the consequences of authenticity. For example, people may experience higher levels of CDMSE when the sense of authenticity is consistent with their behavior. The outcomes in the study of Matsuo (2020) showed that employees are glad with their careers because they are in line with their real selves in the work environment. These results are in accordance with qualitative work ran by Svejenova (2005), which stated that authenticity performs an crucial position in creating significant and innovative careers through exploring identification and improvement of ones' work management. According to the results of the study by Russon & Schmidt (2014), among the elements of authenticity, unbiased processing and the awareness part were found to have statistically significant contributions to CDMSE. In conclusion, the outcome of the research suggested that some domains of authenticity can play a part as a personal asset in the procedure of ones' career development.

Based on the previous findings on authenticity and CDMSE, the following hypothesis emerges:

Hypotheses 3: The level of ones' authenticity, after the intervention, has a higher positive effect on CDMSE, compared to the waiting-list control group.

The mediating effect of authenticity

Previous research suggested that authenticity is linked to signature strengths and CDMSE (Russon & Schmidt, 2014; Matsuo, 2020; Zhang et al., 2019). Earlier findings of Svejenova (2005) showed that authenticity is crucial for developing meaningful and creative careers. This by increasing control over the work and examining ones' identity. Results of the research by Matsuo (2020) showed that authenticity is seen as an essential parameter for generating meaningful careers. Individuals' performance and functioning, the sense of being real and in the right place at work, are examples of positive effects of this increased sense of

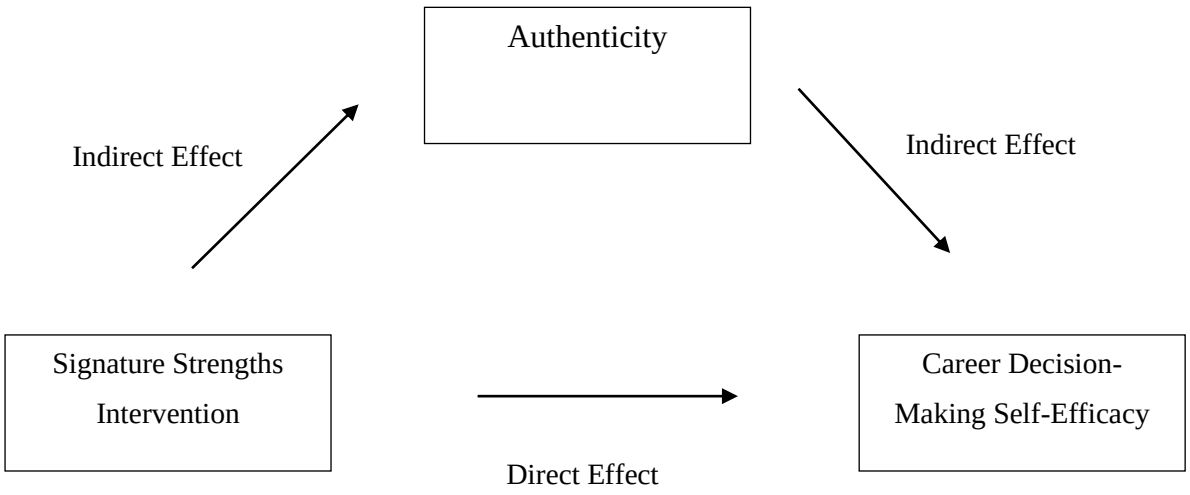
authenticity (Dubreuil et al., 2014). Another study showed that the relation between the use of ones' strengths and career-related and proactive behaviors (e.g. improve present situations and make new ones in work-related context) are mediated by authenticity (Matsuo, 2020), which was not studied before. The findings show that strength use and career satisfaction are fully mediated by work authenticity, and strength use and proactive behavior are partially mediated by work authenticity. This is in accordance with the findings of the theoretical models of Linley (2008) and Buckingham (2007), which assert that individuals expertise a sense of authenticity when they are using their strengths. In addition, these characteristics were positively related to job performance. In other research was found that authenticity can promote concepts like social learning, which is critical for obtaining CDMSE (Zhang et al., 2019). Moreover, an authentic individual would be better able to find a career environment that fits his/her self's needs because they pick an environment that is appropriate and behave in line with their true selves (Schmader & Sedikides, 2017).

In conclusion, the findings of previously mentioned studies show that CDMSE can be influenced by signature-strengths interventions but also authenticity. This has been studied by several researchers but not sufficient enough, which is why the current study focuses on the mediating role of authenticity between the other two concepts. Based on the previous results, the following hypothesis is formed:

Hypotheses 4: Authenticity partially mediates the positive relationship between participating in a signature-strengths intervention and CDMSE.

Figure 1

Mediated relationship diagram



Method

Participants

In the present study, the sample was collected by recruiting Dutch and international master students from multiple universities. There was a criteria for the recruitment that states that only students who are going to graduate this year or have graduated within the past year will be suitable for this study, since the focus is on graduates. The initial dataset consisted of 184 participants, but after correcting for missing values the dataset counted 167 participants. Due to the different focus of intervention not all participants were included for this research. That's why this dataset consisted of 46 participants (33 control, 13 experimental) including 56.5% females (n = 26) and 43.5% males (n = 20). The minimal age was 21 and the maximal age was 30 (M = 23.96 ; SD = 2,21). The demographics are also shown below in table 1. All participants were selected to participate in this study through judgement/purposive sampling. For the recruitment, flyers were created in both Dutch and English. The participation was completely voluntary and there was no financial compensation. At the start of the study,

Ethics approval was obtained from the Ethics Review Board of Tilburg School of Social and Behavioral Sciences, after which the consent form was presented. At the end of the study the participants received a letter with the information about the study. The data collected from the participants was anonymized and kept confidential.

Table 1

Demographic data of the Variables, Frequencies and Percentages

Variables	Description	Frequencies	Percentages
Gender	Female	26	56.5%
	Male	20	43.5%
Age (in years)	Mean	23.96	
	SD	2.21	
	Min- Max	21 - 30	
Nationality	Dutch	23	50.0%
	German	11	23.9%
	Other	12	26.1%
Education/Work	Master's degree	36	78.3%
	Working	8	17.4%
	Looking for work	1	2.2%
	Other	1	2.2%
Sector	Social or Behavioural Sciences (e.g., Psychology, Social Work, Sociology etc.)	19	41.3%
	Economy (e.g., International Business, Marketing Sciences, etc.)	16	34.8%
	Other	11	23.8%

Procedure and design

In the current study the design was longitudinal and quantitative. It was an experimental field study where the participants were randomly assigned to the signature strength intervention or waiting list control group. The dependent variable was "career decision-making self-efficacy" while authenticity served as a mediating variable. The

baseline questionnaires, pre-test (t0) 2 weeks before the intervention, are the “Career Decision-Making Self-Efficacy-Short Form” and the “Authenticity scale”. The post-test (t1), immediately after the intervention ended, consisted of rerunning the “CDMSE-SF”. There was a difference between the participation of the waiting list control group and the experimental group where the experimental group had to do all of the assessments that had been presented with the 3-week signature strengths intervention and the control group only had to participate in the pre-, post- measures.

Signature strengths intervention

Two weeks after finishing the baseline questionnaires (t0), the experimental group (n=13) received a signature strengths intervention. The intervention lasted for three weeks including strength exercises where participants were asked to reflect on their character strengths or to use their character strengths. In the signature strengths intervention, participants used their signature strengths during the exercises which consisted of text and videos and each week they would focus on different strengths.

Earlier research by Louis (2011) suggested two different approaches linked to strength interventions. The first approach was the “identify and use” approach, which focused on how to improve “strength usage & identifying them”. The other approach was the “strengths development” approach, which focused on “strength competency” depending on the situation (Linley, 2008). Research found that interventions of identifying strengths and developing strengths increase coping skills to deal with challenges (Harzer & Ruch, 2015). To improve the interventions at their best, the focus was on identifying, usage and development of strengths. Therefore, the aware-explore-apply model was used for the design of the interventions (Niemiec, 2017). At first, the model focused on increasing strength awareness. At second was how the strengths could be applied and final was the frequency of the implementation. Furthermore, setting meaningful goals by yourself is more motivating than

when the goals are proposed by someone else (Locke & Latham, 2002). Goal setting was included in the implementation phase of the intervention.

Before the start of the signature strength intervention, participants had to fill in the VIA Character Strength Survey after which the results were assigned to the three best strengths. The intervention contained 4 steps. The first step was "strength awareness" where participants get their explanation about their signature strengths. The second phase consisted of "strength exploration", where participants were asked to reflect on their strengths by connecting strengths to their experiences. On top of that, they were asked to imagine how they would feel if they use their strengths. The third step was about "strengths appreciation", where an appreciation exercise (e.g. imagine life without your strengths by focusing on what you feel) related to the participants' strengths were used by letting them write a short gratitude letter about it afterwards. In the final step, they focused on the implementation of the strengths by using their strengths in a new way and practice with it for two weeks each day.

Materials

Career Decision-Making Self-Efficacy-Short Form (CDMSE-SF)

The CDMSE-SF measures the degree to which individuals' self-efficacy is related to the process of career decision-making (Betz et al., 1996). The CDMSE-SF has 25 items which were generated for the purposes of usefulness in giving advice and career assessment (Betz & Luzzo, 1996). The items are divided over five subscales, namely: Self-Appraisal (e.g., "Determine what your ideal job would be"), Occupational Information (e.g., "Change majors if you did not like your first choice"), Goal Selection (e.g., "Make a career decision and then not worry about whether it was right or wrong"), Planning (e.g., "Prepare a good resume"), and Problem Solving (e.g., "Change majors if you did not like your first choice"). For the scoring of the items a 5-point Likert scale is used (1 = no confidence at all, 5 =

complete confidence), so per subscale the minimal score is 5 and maximal score is 25. Earlier research showed a Cronbach's alpha of .94 with a simultaneous validity with other measures (Betz et al., 1996). For this study, only the 20 items of the 4 subscales of self-appraisal, goal selection, planning and problem solving were used, whereas they are most likely to be influenced by the signature strengths intervention and authenticity levels. The average CDMSE-score in this study can vary from 1 to 5, with a higher score indicating a higher level of Career Decision-Making Self-Efficacy. The reliability coefficients for the five subscales differ from moderate to high (.61 to .81) (Buyukgoze-Kavas, 2013). The Cronbach's alpha for the total CDMSE-SF in the current study was .92 at t0 and .89 at t1.

Authenticity scale (AS)

The AS exists of 12 items which are rated on a 7-point Likert scale (1 = does not describe me at all, 7 = describes me very well) (Wood et al., 2008). The scale can be divided in three subscales of authenticity: Authentic Living (AL; e.g., “I can’t say that I’m true to myself in most situations”), Self Alienation (SA; e.g., “I don’t know how I really feel inside”), and Accepting External Influence (AEI; e.g., “Other people influence me greatly”). The higher the scores on the AL subscale, the more this indicates to higher levels of authenticity. On the contrary to the subscales of SA and AEI where higher scores indicate a lower level of authenticity. To calculate the total score of the scale, the scores of eight items of the subscales SA and AEI, which were formulated negatively, were first reverse-coded. Then the answers to the 12 items were added, resulting in a scale score ranging from 12 to 84, with higher ratings indicating a higher level of authenticity. Previous research has found Cronbach’s alpha coefficients ranging from .69 to .78 (Wood et al., 2008). The Cronbach's alpha for the AS in the current study was .86 for t0 and 0.84 for t1.

Data Analyses

To analyse the data, IBM SPSS statistics 27 was used. First of all, the data from the pre- and post-test of control and experimental condition were checked for missing values and incorrect answers. If a participant had any missing values (e.g. no post-test measurements), they were excluded from the data-analyses. Following, the internal reliability and the construct validity of the authenticity and CDMSE scales were tested by means of Cronbach's alpha's and exploratory factor analyses and then scale scores were calculated by averaging the items of the CDMSE-scale and by summing the items of the authenticity scale.

In order to determine whether the randomisation had resulted in comparable groups when it comes to demographics and pre-test measurements, chi-square tests and independent samples t-tests were performed. Also, the answers to three manipulation check questions were used in independent samples t-tests to determine whether the respondents in the intervention group had become significantly more aware of their strengths than the respondents in the control group.

Descriptive statistics of each of the main variables were calculated and the histograms and boxplots were inspected to determine whether the variables were normally distributed and had no extreme outliers. Two mixed ANOVA's were performed to test the first two hypotheses with CDMSE and authenticity as dependent variables respectively. The within subject effect was time (pre vs post) and the between subject effect was group (control vs intervention). To test hypothesis 3 a moderation analysis was performed using the macro PROCESS (Hayes, 2021). The dependent variable was CDMSE (Y) and the independent variable was authenticity (X). Group was included in the model as a moderator (M). To prevent multicollinearity between the two predictors and the interaction term, the continuous variable authenticity was mean-centred before calculating the interaction term and entered in the model. To test the last hypothesis a mediation analysis needed to be performed. As it is a

longitudinal study with two timepoints for both the mediator and the dependent variable, the macro PROCESS could not be used. Instead, the macro MEMORE (Montoya & Hayes, 2017) was used which is developed especially for mediation analyses on repeated measures data. Prior to interpreting the results of the analyses, the assumptions of the main analyses were tested e.g. normality of the residuals, no outliers, homoscedasticity, linearity and no multicollinearity. For all analysis, a threshold value of $\alpha = .05$ (95% confidence interval) was used. For the moderation and mediation analysis bootstrapping (5,000 bootstrap samples) was used.

Results

In order to determine whether the scales that were used to measure the latent variables authenticity and career decision-making self-efficacy were distinct constructs, an exploratory factor analysis with Promax rotation was performed. The KMO measure of sampling adequacy was .523 and the Bartlett's test of Sphericity was significant ($p < .001$) indicating that the data was suitable for factor analysis. Using the Kaiser criterium, nine factors with an eigenvalue > 1 were found. When using two fixed factors, 42.44% of the variance was explained. All items of the authenticity scale loaded on the second factor, with the lowest factor loading being $\lambda = .433$. Also, all items of the CDMSE-scale loaded on the first factor, with the lowest loading being $\lambda = .332$. These results indicate that the two scales measure distinct constructs (Appendix B).

Descriptive statistics

In Table 2 the mean and standard deviation of the main variables in the study at both time points are presented. To examine whether there were associations between the main variables and potential covariates on both time points, Pearson's correlation analyses were performed which are also presented in Table 2. A positive strong correlation was found between post-authenticity (t1) and post- CDMSE (t1) ($r = .699$, $p < .001$) indicating that the

higher the authenticity the higher the career decision making self-efficacy. The pre-authenticity scores were also positively correlated with pre- -test of CDMSE, but this correlation was less strong (r = .331, p = .025). The point-biserial correlation between group (control vs intervention) and pre-intervention measurements was non-significant for authenticity (r = -.008, p = .956), but significant for CDMSE (r = -.353, p =.016). The negative correlation indicates that the intervention group had a significantly lower CDMSE at t0 than the control group. Post intervention the point-biserial correlations between group and authenticity (r = .077, p = .612) and CDMSE (r = -.153, p = .311) were not significant. Furthermore, there were significant positive correlations found between age and the post-test of authenticity (r = .365, p = .013) and CDMSE (r = .359, p = .014). These results indicated that as participants are older, they have both higher authenticity and career decision making self-efficacy after the intervention has taken place. No correlations were found between the main variables authenticity and CDMSE and gender.

Table 2:

Descriptive statistics: Mean, Standard Deviation and Pearson's Correlation (N = 46)

Correlations

Variable	M	SD	1	2	3	4	5	6
1. CDMSE t0	3.42	0.63						
2. CDMSE t1	3.57	0.54	.788**					
3. Authenticity t0	60.91	10.89	.331*	.369*				
4. Authenticity t1	61.50	9.84	.495**	.699**	.660**			
5. Intervention group			-.353*	-.153	-.008	.077		
6. Male			-.045	-.097	.019	-.104	.034	
7. Age	23.96	2.21	.117	.359*	-.046	.365*	-.142	-.163

Note.* p< .05; ** p < .01

Manipulation check

A manipulation check was done to investigate on how the participants perceived the manipulation of the independent variable (SSI). There were three manipulation check

questions, and the average scores to each of the questions between the two groups were compared by performing three independent samples t-tests. In Table 3, the results of the t-tests are reported. When it comes to the first manipulation question, “I am aware of my prominent strenths’, the intervention group (M = 6.00, SD = 1.00) on average answered significantly more in agreement with the statement than the control group (M = 5.38, SD = 1.01; t(43) = -1.89, p = .033). However, no significant differences were found between the two groups answering the other two manipulation check questions.

Table 3

Comparison of the intervention and control group answers to the manipulation questions

	Control group		intervention group			
Manipulation question	M	SD	M	SD	t(43)	p[1]
I am aware of my most prominent strengths	5.38	1.01	6.00	1.00	-1.89	.033
I am aware of the strengths I would like to have	5.59	1.21	5.46	1.13	0.34	.369
I am aware that I have strengths that contribute to my happiness	5.88	0.87	6.23	0.83	-1.26	.108

Note. [1] one-sided p-value

Hypothesis testing

Mixed ANOVAs

The first hypothesis predicted that the signature-strengths intervention had a significant positive effect on the CDMSE of the participants, compared to being in a waiting-list control group. A mixed ANOVA was performed with CDMSE as dependent variable. The within subject effect was time (pre vs post) and the between subject effect was group (control vs intervention). The Shapiro-Wilk test was not significant for both pre- and post measurements of CDMSE, thus indicating that they were normally distributed. As there were only two timepoints the assumption sphericiy was not violated. Results of the mixed ANOVA revealed that there was a significant main effect of time, $F(1,44) = 12.56$, $p < .001$,

partial η^2 = .222.. This indicates that the level of CDMSE over time on average has improved. main effect of group was not significant, F(1,44) = 3.62, p = .064, partial η^2 = .076 on CDMSE, which means that the average level of CDMSE does not differ between the groups. Finally, a significant Time*Group interaction effect was found, F(1,44) = 6.54, p = .014, partial η^2 = .129), meaning that the change in CDMSE over time (from t0 to t1) were significantly different between the two groups. The results of the mixed between within-subject ANOVA for CDMSE are presented in Table 34. In Table C1 in Appendix C, the pairwise comparisons are presented, where the results show us that a significant increase in CDMSE over time of t1 – t0 = 0.37 is found in the intervention group (p < .001) but the increase over time of t1 – t0 = 0.06 in the control group is not significant (p = .359). The interaction plot (Appendix C, Figure C1) demonstrates that there is a slight improvement in the control group for CDMSE from pre to post-measurement, but the steeper slope between t0 and t1 for the intervention group confirms that the CDMSE among participants in the intervention group has improved significantly more than the CDMSE among the control group.. Following from the results it can be concluded that hypothesis 1 is confirmed.

Table 4

Results of Mixed Between- Within-Subject ANOVAs with Group as a Between-Subject and Time as a Within-Subject Factor for CDMSE

Time	Group	M	SD
Pre-test	Control	3.56	0.57
	Experimental	3.07	0.65
Post-test	Control	3.62	0.56
	Experimental	3.44	0.45
Factor	*F*(1,44)	*p*	η_p^2
Time	12.56	<.001	.222
Group	3.62	.064	.076
Time*Group	6.54	.014	.129

The second hypothesis predicted that participation in a signature-strengths intervention will have a positive effect on the participants' feeling of authenticity, compared to a wait-list control group. Again an mixed ANOVA was performed with now Authenticity as dependent variable. The results are presented in table 5 and showed that the main effects of either time, $F(1,44) = 0.49$, $p = .488$, partial $\eta^2 = .011$ or group, $F(1,44) = 0.06$, $p = .816$, partial $\eta^2 = .001$, were not significant. Nor was there a significant Time*Group interaction effect,$F(1, 44) = 0.43$, $p = .515$, partial $\eta^2 = .010$).Because of the fact that there was no interaction effect it can be concluded that the changes in authenticity over time (from t0 tot1) were not different between the two groups. The interaction plot (Figure C2) demonstrates that there is a slight improvement in the intervention group for authenticity over time, while the authenticity remains the same over time in the control group.. Following the results, hypothesis 2 is rejected.

Table 5

Results of Mixed Between- Within-Subject ANOVAs with Group as a Between-Subject and Time as a Within-Subject Factor for Authenticity

Time	Group	M	SD
Pre-test	Control	60.97	9.81
	Experimental	60.77	13.72
Post-test	Control	61.03	10.35
	Experimental	62.69	8.67
Factor	*F(1,44)*	*p*	η_p^2
Time	0.49	.488	.011
Group	0.06	.816	.001
Time*Group	0.43	.515	.010

Regression analyses

The third hypotheses predicted that the level of ones' authenticity, after the intervention (t1), has a higher positive effect on CDMSE, compared to the waiting-list control group. This hypothesis is tested by means of a moderation analysis with the use of PROCESS

macro (Hayes, 2021) model 1. The dependent variable was CDMSE (Y) and the independent variable was authenticity (X). Group was included in the model as a moderator (M). The results are showed in table 5. Authenticity (T1) had a significant effect on CDMSE (b = 0.04, t = 7.10, p < .001), but group did not (b = -0.22, t = -1.85, p = .071). There was also no significant interaction-effect (b = -0.03, t = -1.86, p = .070). This indicates that authenticity is positively associated with CDMSE, this association is comparable in the two groups. Therefore, hypothesis 3 is rejected.

Table 6

Results of Moderation Analysis on CDMSE t1

Predictor	*B*	*SE*	*t*	*P*	R^2
Model 1: $F(1,44) = 18.33$***					. 576
Authenticity T1	0.04	0.01	7.10	<.001	
Group	-0.22	0.12	-1.85	.071	
Interaction	-0.03	0.01	-1.86	.070	
Constant	3.64	0.06	57.30	<.001	
Moderation analysis					

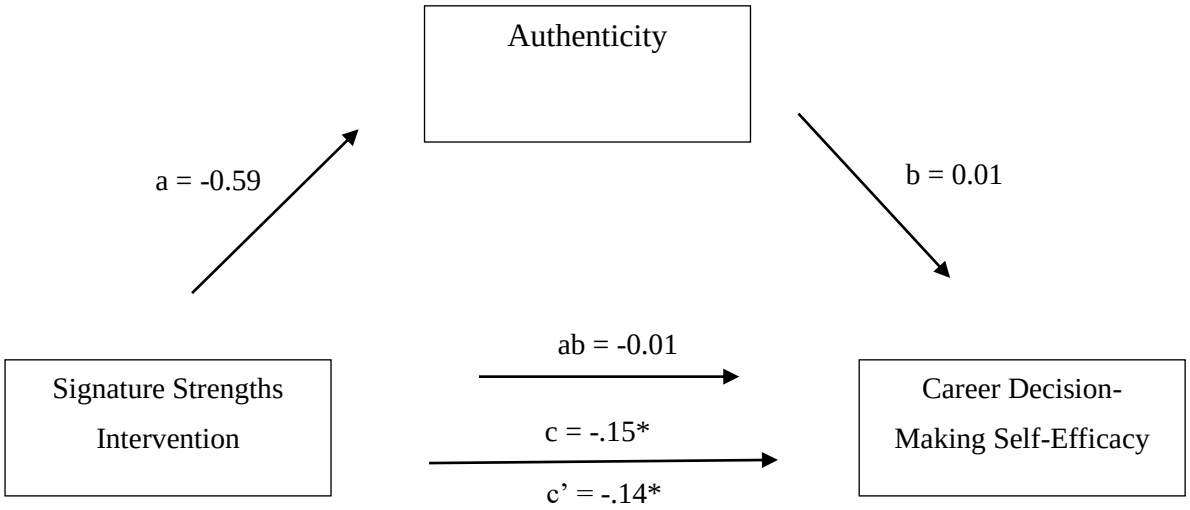
*Note**.: p < .05 **: p < .01 ***: p < .001. Bootstrap sample size = 5000.

Mediation hypothesis

To test hypotheses 4, the macro MEMORE (Montoya & Hayes, 2017) was used which is developed especially for mediation analyses on repeated measures data. The results are displayed in Figure 2. The signature strengths intervention condition has no significant effect on the change in authenticity over time (path *a*) (b = -0.59, t = -0.46, p = .646). The change in

authenticity over time was also found to have a not significant impact on the change in CDMSE over time (path *b*) (b = -0.01, *t* = 1.57, *p* = .124). And, while the total effect of SSI on the change in CDMSE, without authenticity in the model, resulted in a significant effect (path *c*) (b = -0.15, *t* = -2.55, *p* = .014, the direct effect, including authenticity in the model, was also found significant (path *c'*) (b = -0.14, *t* = -2.45, *p* = .018. It appeared that the mediation effect was found to be not significant, as the 95% confidence interval of the indirect effect contained the value of zero (ab = 0.01, 95% CI [-0.05, 0.02]). This means that there is no mediation effect of authenticity on the association between SSI and CDMSE. Following the previous findings, hypothesis 4 is rejected.

Figure 2



Note. *: p < .05 **: p < .01 ***: p < .001

Discussion

In order to make the right career choices, it is important to know where your strengths and interests lie. In contemporary life, this has become increasingly difficult, especially for recent graduates, causing them having difficulties in their self-efficacy in career decision making and a sense of uncertainty in finding their starting job (Jin et al., 2009). The goal of

this study was to address the following research question: *Is there an effect is of participating in signature-strengths interventions on graduates' career decision-making self-efficacy, and is this relationship mediated by authenticity?* To investigate this question, 46 participants were included in the study. By conducting research in the current literature in combination with the current research question, four hypotheses have been formulated.

The results showed that the first formulated hypothesis was confirmed. Hypothesis 1 predicted that (almost)graduated students, who participate in a signature-strengths intervention have a higher CDMSE, compared to students who do not partake in the intervention. The findings of the current study confirm that participating in a signature strengths intervention leads to a higher increase in the level of career decision-making self-efficacy for graduates than when people do not participate in the intervention. This finding is in line with the previous findings of Vela et. al (2018), where the results showed that as the level of strengths improved, the level of CDMSE increased. The results are also in accord with the findings of Schutte and Malouff (2018), who found that the improved use of signature strengths was related to increased self-efficacy. The cause of this could be that the improved awareness of ones' strengths after partaking in a signature strengths intervention, makes it more convenient to focus on a particular career direction.

Furthermore, this current study also sought determine whether there was a relationship between participation in a signature strength intervention and the level of authenticity. Hypothesis 2 was formed from this, which states that participation in a signature strength intervention has a positive effect on the sense of authenticity compared to a waiting-list control group. In contrast to the previous findings of, for example, Medlock (2012) and Seligman (2002), who demonstrated that the use of strengths, as well as people who worked on their strengths and talents, promoted authenticity, the formulated hypothesis 2 was not supported because no association between participation in the signature strength intervention

and authenticity was found. This means that the level of authenticity is not positively influenced by participating in a signature strength intervention. Maybe the participants experienced different results after the intervention than they had expected, for example, the participants could have had the awareness on forehand of their most prominent strengths or level of authenticity and if the outcome after the intervention was not the same as they expected then this could have impacted their sense of authenticity.

The third hypothesis predicted that the level of authenticity, after participation in the intervention, had a stronger positive influence on CDMSE, compared to the waiting list control group. The results of the current study did not support this hypothesis. Although a positive association between authenticity and CDMSE was found, the association was comparable for both the people who partook in the intervention and the people who did not. The fact that there was an association between authenticity and CDMSE is accordance with the previous findings of Russon and Schmidt (2014), who found that elements of authenticity, such as unbiased processing and the awareness part were positively contributes to CDMSE. In addition, research of Svejenova (2005) stated that authenticity performs an crucial position in creating significant and innovative careers through exploring identification and improvement of ones' work management. Moreover, contrary to our hypothesis, we did not find that partaking in the signature strengths intervention strengthens the association between authenticity and CDMSE. As we also found that the intervention did have a positive effect on CDMSE but not on authenticity, it could mean that the signature strengths intervention impacts other mechanisms that are involved in the development of career decision making self-efficacy, other than through improvement of authenticity. But potentially the intervention did only impact one subdimension of authenticity. For future research it is therefor recommended to check which components of authenticity appear to have the strongest impact

on CDMSE for graduates and use an intervention that has more impact on a person's level of authenticity than the current intervention had.

The final hypothesis of the study, which indicated that authenticity partially mediates the positive relationship between participation in a signature-strengths intervention and CDMSE, was also rejected. The results showed that there was no mediation effect of authenticity on the association between participating in a signature strengths intervention and CDMSE. This potential mediation effect has not been investigated in previous studies, although comparable constructs were tested in the study by Matsuo (2020), where the results showed that strength use and proactive behavior (e.g. improve present situations and make new ones in work-related context) were partially mediated and strength use and career satisfaction were fully mediated by work authenticity. To clarify, the improvements in career decision-making self-efficacy that graduates who participated in a signature strengths intervention experienced appear not to be caused by the intervention leading to an improvement in the level of authenticity, but seem to be a direct result of the intervention. One reason for this could be that the intervention itself is enough for people to help them in making career decisions.

Limitations and future research

This study has a few limitations that should be taken into account. The most important limitation is the small sample size. The study included only 46 participants who had participated in the study at both time points, of which only 13 people partook in the intervention condition. This limitation may have impacted the power of the analyses that were performed in the study. For future research it is necessary to gather more participants, particularly in the intervention group, in order to obtain more reliable results and to be able to generalize.

Another limitation of the study was that the intervention was offered entirely online, which may have made it less successful. This may be because the intervention has less interactive elements that can be employed in an online setting. The feedback from several participants indicated that they would have liked more support when partaking in the intervention. Research by Franklin et al. (2009) shows that participants can improve strength awareness and develop their strengths when coaching is offered during an intervention. This reduced effect of the intervention may also have been reflected in the outcomes of the manipulation check. Not all manipulation check questions resulted in improved knowledge of strengths in the intervention group compared to the control group. In addition to the limitations, there are also advantages to doing the intervention online, such as the possibility for foreign people to participate without having to travel. Moreover, in this time of the pandemic, it is useful to do the intervention online instead of in real life with all the strict rules and uncertainties. For future research, it is recommended to seek more contact with the participants during the intervention. For example, schedule online meetings for questions or other comments. In addition, the motivational aspect of the participants, to really apply their strengths in daily life, should be given more attention, in order to then reinforce the intervention so that the training can be optimized and thus the better resultant of behavioral change can emerge.

The third limitation focuses on the study's high number of dropouts. The current study consisted of 46 participants while there were 184 entries for the pre-test. The reason for this may be that the processes of the participants were not followed and controlled accurately, as a result of which participants did not complete the entire intervention. Therefore, feedback from some participants showed that they did not complete all training sessions, but that they were not removed from the sample. For future research, it is therefore recommended to

monitor and/or reward participants' responsibility for completing the intervention more closely.

The last limitation is about the duration of the intervention. The three weeks duration may be too short to notice all effects of the intervention. For example, for the authenticity variable, it is difficult to notice change after three weeks because it is a rather stable construct (Baldwin & Ford, 1988). Therefore, a longer intervention might increase the chance that effects will become observable. For future research, it is advised to develop a longitudinal study and a longer time of the follow-up period because this can contribute to improvement in effect sizes (Sin & Lyubomirsky, 2009).

Final advise for future research is, that it is wise to check whether the intervention could be done for a wider age range and if this could work if was applied world wide. Also check if maybe another aspect has more influence on CDMSE than authenticity.

Theoretical and practical implications

Besides all its limitations, this study adds to the current literature on strength interventions and graduates' CDMSE. Although the results of the study were not all in line with the hypotheses, useful practical implications are highlighted.

The results of this research demonstrates that signature strengths intervention can be beneficial to improve CDMSE in graduates. These findings could have useful implications for higher education institutions and well-being practitioners designing interventions for students.

Considering that CDMSE in general is a crucial element to life contentment and academic success (Vela et al., 2018), educational institutions need to make an effort to offer its students the resources needed to achieve their academic goals.

This research provides an insight into the relationship between signature strengths interventions and the increased level of career decision-making self-efficacy for graduates

and confirms findings of previous research that using your signature strengths is related to increased self-efficacy and career related aspects like improvement on work performance (Schutte & Malouff's, 2018). It is therefor recommended for organizations and universities, to offer and motivate their graduate master's students to participate in a signature strengths intervention to improve their career decision-making self-efficacy if necessary. This in order to make it easier for graduates to find a job that they are actually satisfied with and what can cause students to improve on their work performance and work satisfaction (Lounsbury et al., 2009) and become confident enough to pursue new directions in the work environment (Vela et al., 2018).

As no relationship between participating in a SSI and authenticity was found in the current study, despite the results from previous research suggesting this (Russon & Schmidt, 2014; Svejenova, 2005; Matsuo, 2020)future researchers are recommended to keep in mind that they should not focus solely on a signature strength intervention, if the goal is to enhance the sense of authenticity but also look at other aspects of authenticity that can be influenced positively.

Furthermore, the results show that authenticity is not stronger related to CDMSE for participants in the strength intervention than for persons who do not partake in a strength intervention, nor does the intervention improve CDMSE through increasing ones authenticity. This despite of the findings that authenticity promotes aspects of CDMSE. Researchers could take this into account when developing interventions or further research for university students.

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Appendix A

Qualtrics questionnaires

State Authenticity Scale

1. Right now, I think it is better to be yourself, than to be popular.
2. Right now, I don't know how I really feel inside.
3. Right now, I am strongly influenced by the opinions of others.
4. Right now, I usually do what other people tell me to do.
5. Right now, I feel I need to do what others expect me to do.
6. Right now, other people influence me greatly.
7. Right now, I feel as if I don't know myself very well.
8. Right now, I stand by what I believe in.
9. Right now, I am true to myself in most situations.
10. Right now, I feel out of touch with the 'real me'.
11. Right now, I live in accordance with my values and beliefs.
12. Right now, I feel alienated from myself.

7-point Likert Scale: 1 (*strongly disagree*) to 7 (*strongly agree*).

Career Decision-Making Self-Efficacy Scale–Short Form

Participants respond to items on a 5-point Likert-type scale ranging from 1 (no confidence at all) to 5 (complete confidence). Total score is calculated by averaging the responses across all the items. Q1, 10, 15, 19, 23 = items for Occupational Information subscale (We are not using this subscale, that's why /); Q5, 9, 14, 18, 22 = Self-Appraisal; Q2, 6, 11, 16, 20 = Goal Selection; Q3, 7, 12, 21, 24 = Planning; Q4, 8, 13, 17, 25 = Problem Solving.

1. /
2. Select one career from a list of potential careers you are considering
3. Make a plan of your goals for the next 5 years
4. Determine the steps to take if you are having trouble studying for part of your chosen career
5. Accurately assess your abilities
6. Select one occupation from a list of potential occupations you are considering
7. Determine the steps you need to take to successfully attain your chosen career
8. Persistently work at your career goal even when you get frustrated
9. Determine what your ideal job would be
10. /
11. Choose a career that will fit your preferred lifestyle
12. Prepare a good resume
13. Change careers if you did not like your first choice
14. Decide what you value most in an occupation
15. /
16. Make a career decision and then not worry about whether it was right or wrong
17. Change occupations if you are not satisfied with the one you enter

18. Figure out what you are and are not ready to sacrifice to achieve your career goals
19. /
20. Choose a career that will fit your interests
21. Identify employers, firms, institutions relevant to your career possibilities
22. Define the type of lifestyle you would like to live
23. /
24. Successfully manage the job interview process
25. Identify some reasonable career alternatives if you are unable to get your first choice

Appendix B

Results factor analysis

Pattern Matrix[a]

	Factor	
	1	2
State_Authenticity_1,00: 1. Right now, I think it is better to be yourself, than to be popular.	-,057	**-,595**
State_Authenticity_2,00: 2. Right now, I don't know how I really feel inside.	-,294	**,522**
State_Authenticity_3,00: 3. Right now, I am strongly influenced by the opinions of others.	,126	**,729**
State_Authenticity_4,00: 4. Right now, I usually do what other people tell me to do.	,393	**,576**
State_Authenticity_5,00: 5. Right now, I feel I need to do what others expect me to do.	,110	**,597**
State_Authenticity_6,00: 6. Right now, other people influence me greatly.	,197	**,611**
State_Authenticity_7,00: 7. Right now, I feel as if I don't know myself very well.	-,146	**,676**
State_Authenticity_8,00: 8. Right now, I stand by what I believe in.	,147	**-,433**
State_Authenticity_9,00: 9. Right now, I am true to myself in most situations.	,004	**-,556**
State_Authenticity_10,00: 10. Right now, I feel out of touch with the 'real me'.	-,173	**,678**
State_Authenticity_11,00: 11. Right now, I live in accordance with my values and beliefs.	,245	**-,494**
State_Authenticity_12,00: 12. Right now, I feel alienated from myself.	,020	**,665**
CDMSE___SF_1,00: - Make a plan of your goals for the next 5 years.	**,653**	,290
CDMSE___SF_2,00: - Select one career from a list of potential careers you are considering.	**,724**	,185
CDMSE___SF_3,00: - Determine the steps to take if you are having trouble studying for part of your chosen career.	**,537**	,060
CDMSE___SF_4,00: - Accurately assess your abilities.	**,332**	-,076
CDMSE___SF_5,00: - Select one occupation from a list of potential occupations you are considering.	**,726**	,155
CDMSE___SF_6,00: - Determine the steps you need to take to successfully attain your chosen career.	**,634**	,021
CDMSE___SF_7,00: - Persistently work at your career goal even when you get frustrated.	**,468**	-,044
CDMSE___SF_8,00: - Determine what your ideal job would be.	**,777**	,155
CDMSE___SF_9,00: - Choose a career that will fit your preferred lifestyle.	**,843**	-,071
CDMSE___SF_10,00: - Prepare a good resume.	**,460**	-,023
CDMSE___SF_11,00: - Change careers if you did not like your first choice.	**,381**	-,134
CDMSE___SF_12,00: - Decide what you value most in an occupation.	**,575**	,204
CDMSE___SF_13,00: - Make a career decision and then not worry about whether it was right or wrong.	**,570**	-,086
CDMSE___SF_14,00: - Change occupations if you are not satisfied with the one you enter.	**,474**	-,197
CDMSE___SF_15,00: - Figure out what you are and are not ready to sacrifice to achieve your career goals.	**,496**	-,154
CDMSE___SF_16,00: - Choose a career that will fit your interests.	**,610**	-,128
CDMSE___SF_18,00: - Identify employers, firms, institutions relevant to your career possibilities.	**,616**	-,210
CDMSE___SF_19,00: - Define the type of lifestyle you would like to live.	**,742**	-,093
CDMSE___SF_20,00: - Successfully manage the job interview process.	**,517**	,092
CDMSE___SF_21,00: - Identify some reasonable career alternatives if you are unable to get your first choice.	**,636**	-,128

Extraction Method: Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization.

Appendix C

Figures

Figure C1

*Time*Group interaction H1*

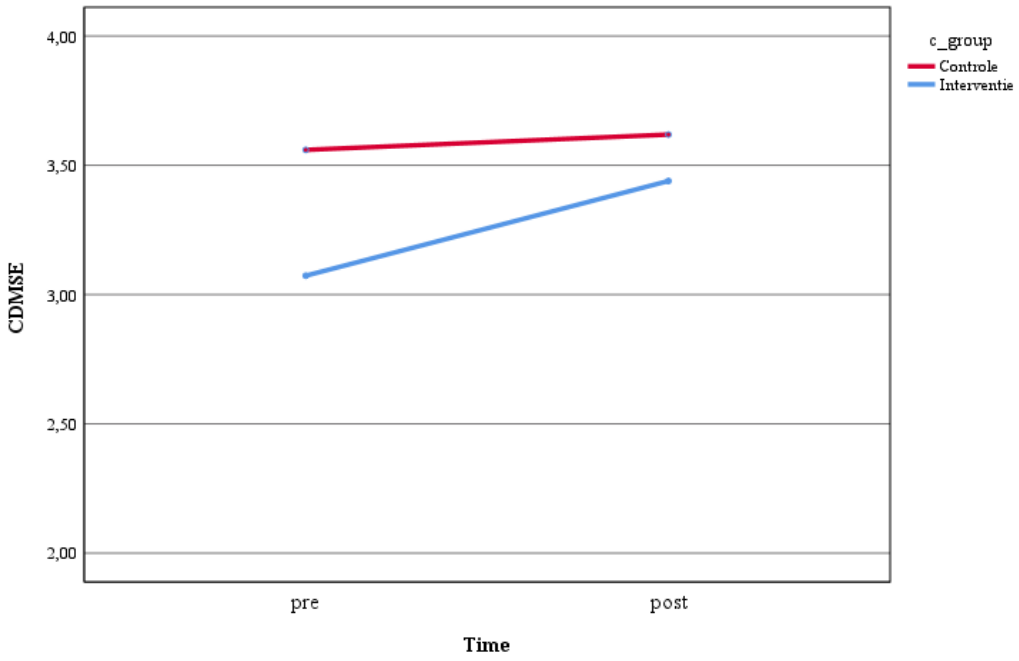

Table C1

Pairwise Comparisons

Measure: CDMSE

c_group	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
						Lower Bound	Upper Bound
Controle	1	2	-,059	,064	,359	-,188	,069
	2	1	,059	,064	,359	-,069	,188
Interventie	1	2	-,366*	,102	<,001	-,571	-,161
	2	1	,366*	,102	<,001	,161	,571

Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Figure C2

*Time*Group interaction H2*

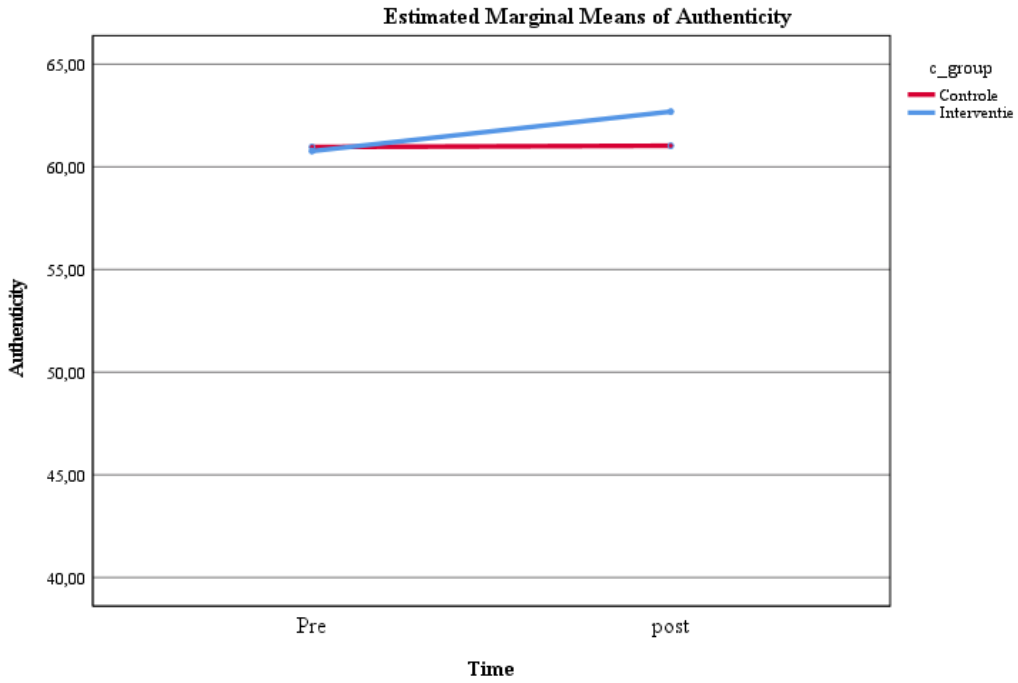

Table C2

Pairwise Comparisons

Measure: Authenticity

c_group	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Controle	1	2	-,061	1,507	,968	-3,098	2,977
	2	1	,061	1,507	,968	-2,977	3,098
Interventie	1	2	-1,923	2,401	,428	-6,763	2,917
	2	1	1,923	2,401	,428	-2,917	6,763

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

Appendix D

Run MATRIX procedure:

********** MEMORE Procedure for SPSS Version 2.1 **********

Written by Amanda Montoya

Documentation available at akmontoya.com

****

Model:
1

Variables:
Y = Pre_CDM POST_CDM
M = Pre_auth Post_aut

Computed Variables:
Ydiff = Pre_CDM - POST_CDM
Mdiff = Pre_auth - Post_aut
Mavg = (Pre_auth + Post_aut) /2 Centered

Sample Size:
46

****
Outcome: Ydiff = Pre_CDM - POST_CDM

Model

	Effect	SE	t	p	LLCI	ULCI
'X'	-,1460	,0573	-2,5475	,0143	-,2614	-,0306

Degrees of freedom for all regression coefficient estimates:
45

****
Outcome: Mdiff = Pre_auth - Post_aut

Model

	Effect	SE	t	p	LLCI	ULCI
'X'	-,5870	1,2686	-,4627	,6458	-3,1420	1,9681

Degrees of freedom for all regression coefficient estimates:
45

****
Outcome: Ydiff = Pre_CDM - POST_CDM

Model Summary

R	R-sq	MSE	F	df1	df2	p
,2425	,0588	,1487	1,3428	2,0000	43,0000	,2719

Model

	coeff	SE	t	p	LLCI	ULCI
'X'	-,1398	,0570	-2,4517	,0184	-,2547	-,0248
Mdiff	,0106	,0067	1,5689	,1240	-,0030	,0242
Mavg	-,0042	,0061	-,6788	,5009	-,0166	,0082

Degrees of freedom for all regression coefficient estimates:
43

********** TOTAL, DIRECT, AND INDIRECT EFFECTS **********

Total effect of X on Y

Effect	SE	t	df	p	LLCI	ULCI
-,1460	,0573	-2,5475	45,0000	,0143	-,2614	-,0306

Direct effect of X on Y

Effect	SE	t	df	p	LLCI	ULCI
-,1398	,0570	-2,4517	43,0000	,0184	-,2547	-,0248

Indirect Effect of X on Y through M

	Effect	BootSE	BootLLCI	BootULCI
Ind1	-,0062	,0172	-,0529	,0175

Indirect Key
Ind1 'X' -> Mdiff -> Ydiff

********** ANALYSIS NOTES AND WARNINGS **********

Bootstrap confidence interval method used: Percentile bootstrap.

Number of bootstrap samples for bootstrap confidence intervals:
5000

The following variables were mean centered prior to analysis:
(Pre_auth + Post_aut) /2

Level of confidence for all confidence intervals in output:
95,00

------ END MATRIX -----