

**How Do People See Their Future? – An Examination of Futures Consciousness in  
Relation with Self-Determination and Optimism**

Vanessa Hempen, s2822938

Department of Psychology, University of Twente

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First Supervisor: Merlijn Koch

Second Supervisor: Dr. Gerben Westerhof

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### **Abstract**

Being conscious of the future is crucial to face the increasing global complexity, speed of change and disruption. Hereby, the focus lays on how people are thinking about how their future might look like, engage in cognitive thinking and planning, and their present behaviour regarding their future. Futures Consciousness (FC) evaluates peoples' outlook on their future, as well as their proactive behaviour and adaptation to it.

This research study aims to examine the relation of Self-Determination (SD), along with its individual needs (Autonomy, Competence, and Relatedness), and FC, and if this relation is mediated by Personal Optimism (PO). This study was conducted using a cross-sectional study design with one-time data collection in form of one questionnaire on a sample of educated Dutch population groups with variety across age groups ( $N=93$ ). The Futures Consciousness Scale (Ahvenharju et al., 2022), the Basic Psychological Need Satisfaction and Frustration Scale (Van der Kaap-Deeder et al., 2020), and the short form of the Questionnaire for the Assessment of Personal Optimism and Social Optimism-Extended (Jovanović et al., 2021; Schweizer & Koch, 2001; Rauch et al., 2008) were used. Results showed that Self-Determination as well as the individual needs Autonomy, Competence, and Relatedness, were significantly positively related to FC ( $p<.01$ ). PO did not mediate the relationship between SD and FC, as it was not significantly related to FC. Further research, which should consider a larger and heterogenous sample, should take other concepts that could have an impact on the relationship between SD and FC into account.

*Keywords:* Futures Consciousness, Self-Determination, Personal Optimism, Agency Beliefs, Concern for Others

## **How Do People See Their Future? – An Examination of Futures Consciousness in Connection with Self-Determination and Optimism**

Humans always thought about how their future could look like and planned their next steps accordingly. Already in the early stages of the development of human societies, humans had some lookout on the future to make sure they would survive (Vale et al., 2012). This phenomenon can be observed nowadays as well, looking at, for example, the climate crisis and the demonstrations people are organizing to have an influence on their future (Venghaus et al., 2022). The current developments in the world, as, for instance, the climate crisis, foster increasing global complexity and increasing speed of change as well as disruption (Lalot, et al., 2021) Thus, it seems crucial to be conscious about how one's future might look like as well as dealing with a certain amount of uncertainty (Lalot, et al., 2021).

Additionally, having an outlook on the future is proven to empower groups that are normally less heard to act regarding the future (Bourgeois et al., 2017). Hereby, Bourgeois et al. (2017) highlight that an actionable outlook on the future enables marginalized groups to participate in informed decision-making as well as influencing policies, which can shape their personal lives and hence, makes them proactively change in the present. Correspondingly, people that belong to rather marginalized groups then do understand the influence of the present on the future more clearly and are more likely to act accordingly (Bourgeois et al., 2017) This, in turn, leads to new opportunities and maybe even societal change for these groups (Bourgeois et al., 2017).

Moreover, peoples' outlook on their future can be divided in their outlook on the future on a societal level and into their outlook on their own personal future (Sools, 2020). According to Sools (2020), the goal of futures studies is to investigate how peoples' imaginations of possible futures impact their present behaviour. Congruently, people tend to plan because they are behaving goal-directed due to the urge to attain a certain facet of possible future, which requires a certain amount of task knowledge, that, in turn, gets activated by their goals (Locke, 2000; Lombardo, 2007). In addition, the research of Lombardo (2007), emphasises the role of wisdom, which he defined as the capacity to set all aspects of life into perspective while taking ethics and virtue as groundwork and applying it to ensure enhanced well-being for themselves and others. Hereby, wisdom functions to integrate understanding of future consciousness and therefore helps to foster an ethical and psychological informed and enhanced futures consciousness. Thus, missing wisdom or knowledge might lead to people believing they have little opportunities for the future and therefore limiting their own ambitions (Locke, 2000; Lombardo, 2007). To see how people think about how their future might look like, how people

engage in cognitive thinking and planning about their future, along with how they might act in the present regarding their foreseeable, as well as their uncertain future, Futures Consciousness can be considered (Ahvenharju et al., 2021).

### **Futures Consciousness**

There are several definitions of Futures Consciousness (FC) in already existing research. Considering the research of Lombardo (2016), who researched about Future Consciousness, it can be defined as “the total integrative set of psychological abilities, processes, and experiences humans use in understanding and dealing with the future” (p.126). Hereby, by being aware of possible futures and possible selves, people are more likely to change their behaviour to attain a certain possible self and avoid possible selves they perceive as negative (Markus & Nurius, 1986). When speaking about FC, it is crucial to examine that being aware of the future builds on the learning capability of humans, since it is proven that we learn from past experiences and adapt our behaviour accordingly (Lombardo, 2007). Moreover, being open to alternatives through the capability of using creativity and imagination is proven to help with being more conscious of the future and possible outcomes (Byrne, 2007). According to the research of Ahvenharju et al. (2018, 2021), Futures Consciousness is a multifaceted psychological capacity and capability that not only involves cognitive, but also emotional and motivational processes, enabling individuals to anticipate and engage with potential future scenarios. Hereby, FC includes the awareness that present actions have an influence on the future, that promotes active engagement with possible futures. Additionally, it is important to differentiate Futures Consciousness from Futures Literacy (FL), which was coined by Miller et al. (2022), defined by Larsen et al. (2022), and utilized by UNESCO (2024). According to the aforementioned sources, FL encompasses the skill humans have to grasp the importance and influence of the future on their current perception and behaviour. Hereby, by imagining different possible futures, people practice this skill and therefore practice their FL (UNESCO, 2024). Moreover, Ahvenharju et al. (2018) highlight the importance of additional neighbouring concepts like future orientation, prospective attitude, or anticipation, which encompasses the cognitive interest in possible futures through implicit and explicit future-oriented activities. Accordingly, humans cannot be passive in the realization of their future and therefore must take an active role in shaping it (Lombardo, 2007). Hence, FL refers to the set of competencies for practical application, which enables individuals (and organisations) to anticipate, prepare, and navigate future scenarios. In contrast, FC embodies a broader cognitive and emotional

orientation towards one's future, that encompasses the individual's attitudes and motivations regarding future possibilities.

Futures Consciousness can be distinguished by five dimensions, namely Time Perspective, Agency Beliefs, Openness to Alternatives, Systems Perception, and Concern for Others (Ahvenharju et al. 2018, 2021). The definitions of these dimensions and which psychological concepts they encompass can be found in Table 1, as well as in Appendix A (Ahvenharju, et al., 2021).

**Table 1**

*Definitions of the Five Dimensions of FC and Connected Concepts According to Ahvenharju et al. (2018, 2021)*

Dimension	Definition	Concepts
Time Perspective	How much we orient ourselves towards the future	Future Orientation; Consideration of Future Consequences
Agency Beliefs	How much we trust in our ability to influence how the future unfolds	General Self-Efficacy; Locus of Control; Optimism
Openness to Alternatives	How much we critically question established truths and our openness to how different the future can be	Openness to Experience; Critical Thinking
Systems Perception	How easily we see how human and natural systems are interconnected and recognize the complex consequences of decisions	Systems Thinking; Ecopsychological Self
Concern for Others	How much we have broadened our moral and ethical values to include physically or temporally distant people	Self-Transcendence Values; Identification with All Humanity

Since, according to Ahvenharju et al. (2018, 2022) and Sools (2020), the different dimensions of Futures Consciousness are connected to the current behaviour of people, connecting these findings to the research of Locke (2000) and Lombardo (2007) might be insightful to investigate which motivational factors contribute to how people are determining how they act. Therefore, this research will take Self-Determination into account, which is seen as an important and widely used construct in psychology to predict motivation, behaviour, and wellbeing (Deci & Ryan, 2015).

### **Self-Determination**

Self-Determination (SD) is a concept of the Self-Determination Theory by Deci & Ryan (2015) that seems crucial to look at when talking about Futures Consciousness. This is the case since SD was initially composed of a motivational theory that contrasts intrinsic and extrinsic motivation (Hidi, 2000). Based on motivation, it might be possible to state why people behave in a certain way when it comes to their future, and therefore, how they determine which possible self they want to be (Altintas et al., 2020). According to Merriam-Webster (2024a), Self-Determination can be defined as “free choice of one’s own acts or states without external compulsion”. Deci & Ryan (2015) distinguished three basic needs their Self-Determination Theory (SDT) comprises, namely Autonomy, Competence, and Relatedness, which will be elaborated on in the following.

#### ***Autonomy***

Autonomy, as described in the research of Deci and Ryan (2000, 2015), can be defined as the feeling of being able to make decisions or choices and behave freely and in a flexible matter. Additionally, the feeling of choice through autonomy increases a person’s intrinsic motivation (Deci & Ryan, 2015). Moreover, autonomy was found to be of importance for peoples’ psychological wellbeing not only in Western, but also in Eastern countries and therefore is an important concept to investigate.

#### ***Competence***

Competence, as defined by Legault (2020), is “the psychological need to exert a meaningful effect on one’s environment” and “refers to the innate propensity to develop skill and ability, and to experience effectance in action” (Abstract). Hereby, people tend to feel less competent when they have a rather impersonal orientation, which encompasses that people see desired actions as outside of their intentional control (Deci & Ryan, 2015). Furthermore, when people get positive feedback for their achievements, it heightens their feeling of competence, and, in turn, their intrinsic and extrinsic motivation (Deci & Ryan, 2015). Therefore, perceived

competence is important to maintain intrinsic and extrinsic motivation, but this is only possible to achieve when people perceive they have autonomy as well (Ryan & Deci, 2000).

### ***Relatedness***

Relatedness, according to the research of Tinsley & Tinsley (2004), “refers to the desire to feel loved, connected to others, and meaningfully involved with the broader social world” (p.167). Corresponding to feeling related to others, people integrate ways of thinking or behaviours of people who are meaningful to them into their own self-concept (Deci & Ryan, 2015). Additionally, through the desire to feel close and related to others, peoples’ intrinsic and extrinsic motivation increases (Deci & Ryan, 2015).

Looking at Futures Consciousness and Self-Determination, it can be stated that, according to the aforementioned findings, there seems to be a complex pattern of relations between the two variables as well as between the needs of SD and some of the dimensions of FC. For instance, the dimension of Agency Beliefs might be connected to the needs of Autonomy and Competence, and Concern for Others might be connected to the need of Relatedness. Hence, SD, as well as its dimensions, can be expected to be related to FC to a certain extent.

Since Futures Consciousness takes the fortune of positive anticipation, which in this context can be seen as a form of future-oriented motivation, into account and Self-Determination generally takes peoples’ motivation into account, it seems valuable to look deeper into the relation that Optimism, specifically Personal Optimism (PO), has with each of these concepts.

### **Optimism**

Optimism, which can be defined as “an inclination to put the most favourable construction upon actions and events or to anticipate the best possible outcome” (Merriam-Webster, 2024b), is a concept in the Futures Consciousness dimension Agency Beliefs of the Futures Consciousness Theory by Ahvenharju et al. (2021). Hereby, it is crucial to mention that the research of Ahvenharju et al. (2021), is focused on optimism in the sense of their future in a societal matter rather than on peoples’ personal optimism.

Humans tend to behave in a way that reinforces their hopes, which are linked to their optimism regarding the future, and avoid their fears, which are connected to their pessimism regarding the future (Lombardo, 2007). Additionally, optimism is said to enhance behaviour that is founded on futures consciousness, since it reinforces goal-directed behaviour (Locke, 2000; Lombardo, 2007). Furthermore, the research of Lombardo (2007) has shown that

optimism can be connected to self-efficacy, and pessimism can be connected to perceived helplessness, which both can be connected to the Self-Determination Theory since they play a role in motivation. The findings of Ahvenharju et al. (2021) imply that optimism can not only lead to behaviour change but can as well lead to apathy, which would lead to taking little or not taking any action regarding the future. Thus, it seems crucial to investigate what enhances peoples' personal optimism regarding their personal future and future selves. This would lead to gaining more insight in their resulting behaviour in the present and how personal optimism may be related to SD. When looking at the aforementioned findings about optimism and the dimensions FC incorporates, Optimism can be connected to Agency Beliefs by taking into account that being optimistic enforces the trust in the own ability to influence the future. Thus, Personal Optimism might then as well have an influence on the trust one has regarding influencing one's personal future.

As stated earlier, Futures Consciousness appears to be of increased importance regarding the increasing global complexity and speed of change (Lalot et al., 2021). It gives us insight into peoples' sense of their futures and, attributable to that, their behaviour in the present (Altinas et al., 2020, Lalot et al., 2021). Therefore, it seems crucial to research FC more extensively. Additionally, it seems of importance to take the FC of a broad age group into account, to ensure having a heterogenous sample and therefore more distribution across age groups in the Dutch population. Younger generations, as students, are likely to have a more international sense of the future and therefore also a different outlook on the future (Teo et al., 2024). Meanwhile, the older generations, as employees might already have some influence in the world due to being rather settled compared to younger generations, along with having influence for longer than past generations due to having longer lives and later retirements (North & Fiske, 2015). Moreover, since there is not much explicit research about the link of Self-Determination in connection to FC, it might be valuable to look deeper into, as it might give some indication of peoples' current behaviour due to feeling capable to take actions (Lombardo, 2007; Sools, 2020). Therefore, younger generations and older generations could be considered regarding the factors influencing their motivation to act in relation to their future. Additionally, the variable of Optimism in the sense of Personal Optimism is interesting to look deeper into in the context of FC, since it could give more indication of how people see and look at their personal futures. Moreover, it might be insightful to investigate the relation of FC, SD, and PO, since only optimism in a more societal sense was already integrated in FC. Accordingly, it is important to examine Personal Optimism regarding the influence it has on the relationship of SD and FC.



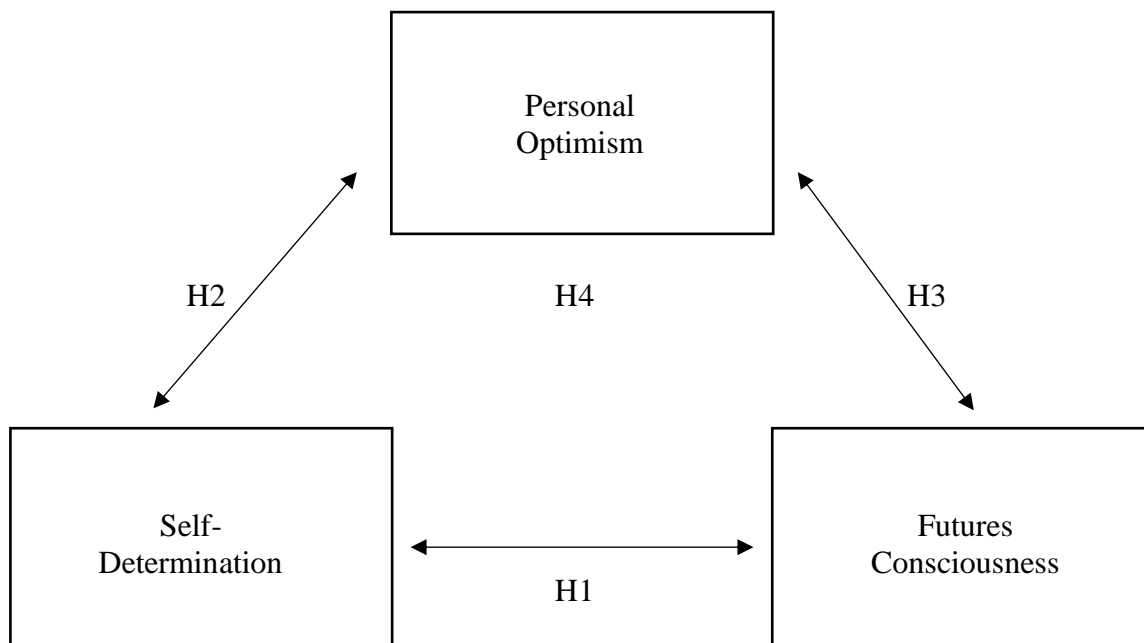
Consequently, in this report, more insight will be provided on which relation SD has to FC, as well as how PO might influence this relationship as a mediator variable. This will be conducted in a cross-sectional study targeting Dutch population groups. There has already been some research on how FC and Optimism may be related as Optimism is a concept of Agency Beliefs of the FC Scale (Ahvenharju et al., 2018, 2021; Lombardo, 2007), as well as how FC and dimensions of the Self-Determination Theory may be related (Deci & Ryan, 2015). However, there has not been research regarding the relationship between FC, SD, and PO yet. Hence, this report aims to especially examine the relationship between FC and SD, taking Personal Optimism into account.

Regarding the aforementioned points, the research questions “How does Self-Determination relate to Futures Consciousness in Dutch population groups?” and “To what extent does Personal Optimism mediate the relationship between Futures Consciousness and Self-Determination?” can be stated. These research questions, in turn, lead to the following hypotheses:

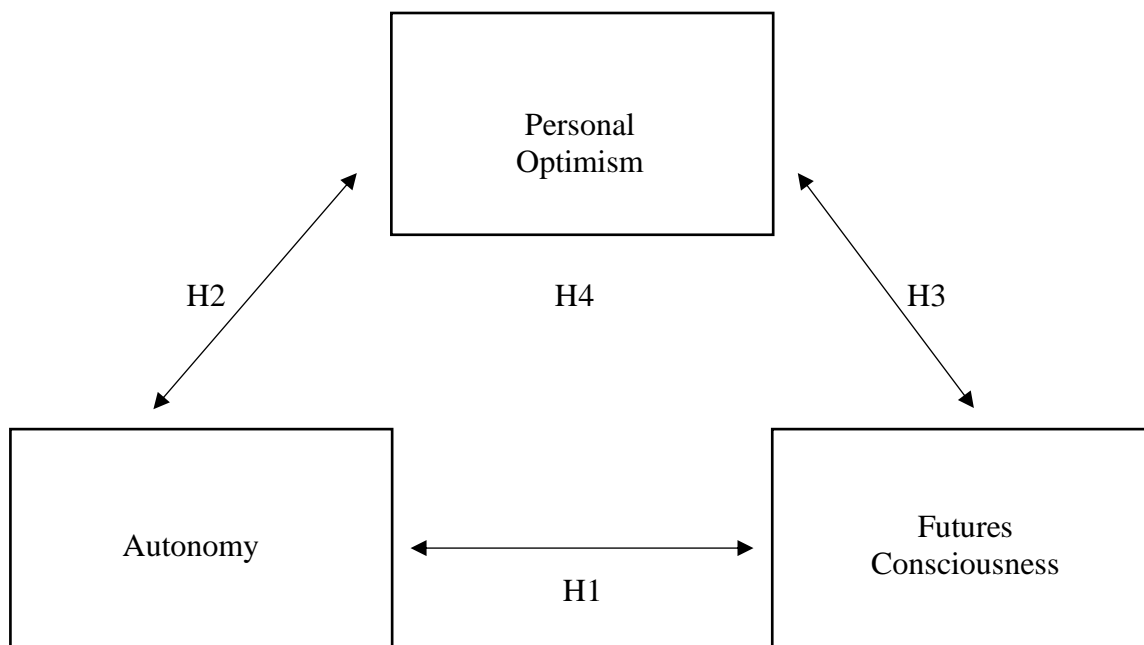
1. Higher levels of Self-Determination, as well as higher levels of the three independent needs Autonomy, Competence, and Relatedness are positively related to Futures Consciousness.
2. Higher levels of Self-Determination, as well as of the three independent needs, positively relate to the level of Personal Optimism.
3. Personal Optimism is positively related to Futures Consciousness.
4. Personal Optimism mediates the relationship between Self-Determination, as well as the three independent needs, and Futures Consciousness.

**Figure 1**

*General Model of Research with Corresponding Hypothesis Paths*

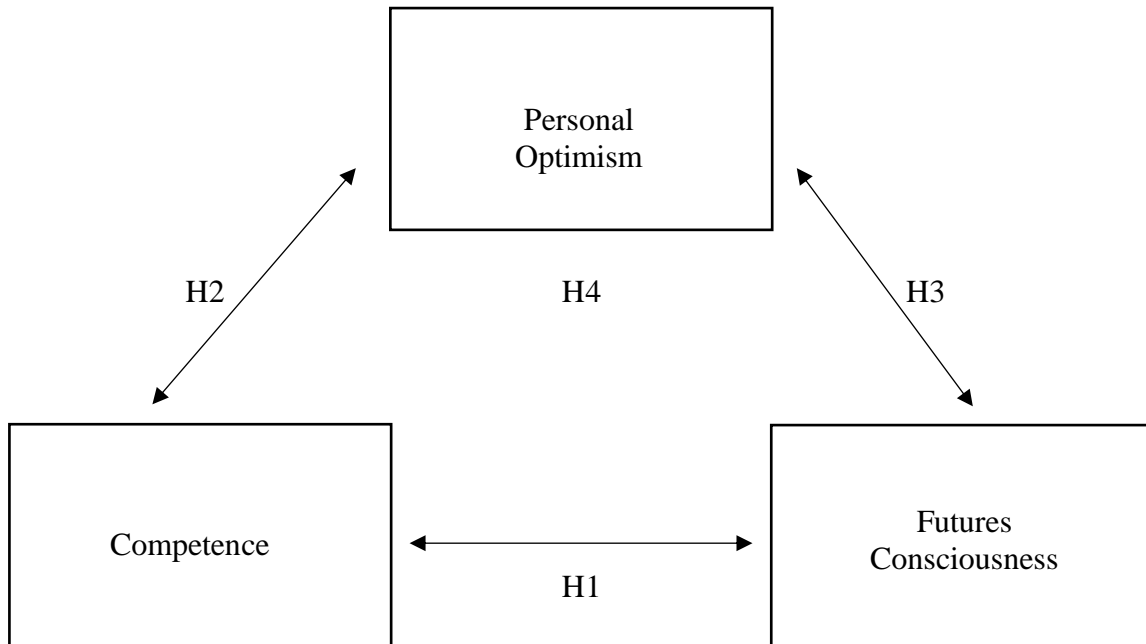
**Figure 2**

*Model including Autonomy with Corresponding Hypothesis Paths*

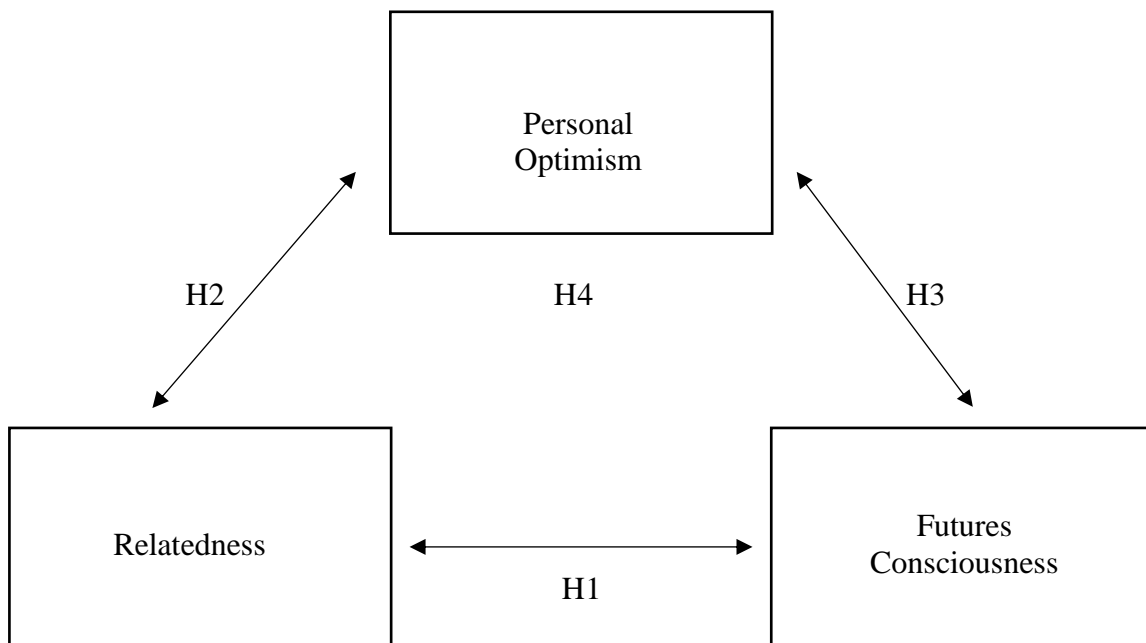


**Figure 3**

*Model including Competence with Corresponding Hypothesis Paths*

**Figure 4**

*Model including Relatedness with Corresponding Hypothesis Paths*



## Methods

### Design

This study aims to assess Futures Consciousness in rather educated Dutch population groups across a variety of age groups, considering the variables of Self-Determination, Autonomy, Competence, Relatedness and Personal Optimism. The study design was a cross-sectional study with one-time data collection. Prior to data collection, Ethical approval was gathered through the Ethics committee of the University of Twente (request number: 240209). The relationship between these variables was tested for mediation, with SD as well as each of its three needs as the independent variable, FC as the dependent variable, and PO as the mediator variable (see Figures 1 to 4).

### Participants

The study uses a non-probability convenience sampling method, emerging in a sample of 93 participants from the Dutch population. Participants that took part in the study needed to be over the age of 18, and fluent in the Dutch language to be considered part of the Dutch population group. Of the 93 participants 36 were identifying as male, 55 were identifying as female and two as non-binary. The age of the participants ranged from 18 to 72 years, with a mean age of 43.2 years ( $SD=16.0$ ). Additionally, the sample was composed of 15 students ( $N=1_{parttime}$ ,  $N=14_{fulltime}$ ), 66 employees, and 12 participants who currently were in other activities than studying or working. The distribution of the participants' highest diploma of education they obtained is displayed in Table 2, showing that the sample was rather homogenous in terms of their education level.

**Table 2**

*Distribution of Highest Obtained Diploma Among the Participants*

Highest diploma obtained	Number of Participants	Percentage
Basisonderwijs	3	3.2
VMBO	1	1.1
HAVO	4	4.3
VWO	11	11.8
MBO	6	6.5
Bachelor (HBO/WO)	19	20.4
Master (HBO/WO)	43	46.2
Doctor, PhD	6	6.5

## Materials

To participate in the study, a technical device with internet access (e.g. smartphone, laptop, or tablet) was required. The study consisted of one questionnaire, which included three independent scales. The three individual scales used were the Futures Consciousness Scale (FC Scale) (Ahvenharju, 2022), the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) (Van Der Kaap-Deeder et al., 2020), and the short form of the Questionnaire for the Assessment of Personal Optimism and Social Optimism-Extended (POSO-E-SF) (Jovanović et al., 2021; Schweizer & Koch, 2001; Rauch et al., 2008).

Since only the BPNSFS questionnaire was already available to use in Dutch, the FC Scale, as well as the POSO-E-SF had to be translated prior to publishing the questionnaire. To achieve an accurate translation, the Backward Translation Method was used, meaning that the questionnaires were translated by the researchers and revised by the supervisors of this thesis, who are native Dutch speakers. After, the Dutch version was backward translated by the supervisors of this thesis, and afterwards, revised again. This procedure was done multiple times, until the meaning of the questions of the Dutch translation was similar to the original English version of the questionnaires.

After that, data from the participants was collected in a collaborative way by a research team, using a quantitative online survey containing self-report online questionnaires. For this report, only parts of the questionnaire data were be used, since not all data was relevant to answer the hypotheses. Finally, at the end of the survey, the researchers' contact details, as well as the option to withdraw from the study at any time were displayed. In the following, the three scales will be introduced.

### *Futures Consciousness Scale (FC Scale)*

The FC Scale is a psychometric measure to assess FC in individuals. The English version provides acceptable structural validity, as well as good convergent, discriminate, and concurrent validity (Lalot et al., 2021; Ahvenharju, 2022). It is composed of 20 items, such as "1. I think about the consequences before I do something", using a 5-point Likert scale ranging from 1 "not at all like me" to 5 "very much like me" and is divided into five subscales, including "Time Perspective", "Agency Beliefs", "Openness to Alternatives", "System Perceptions", and "Concern for Others". Additionally, the FC Scale has several negative subscale items, namely items 6, 7, and 12. For the newly acquired Dutch version of the questionnaire, a factor analysis of the five dimensions using a one-factor-model and the minimum residual method with varimax rotation, as well as a reliability analysis was conducted by adding all items which showed a moderate and reasonable fit (RSMR=.11, Fit based upon off diagonal values =.81),

and a moderate level of explained variance of 48%. Hereby, items 5, 6, 7, and 8 had low or negative factor loadings and therefore did not load on the factor as expected. Additionally, the Dutch version shows high internal consistency ( $\alpha > .80$ ). The following table displays Cronbach's alpha for each subscale of FC (see Table 3). Scores on the FC scale are computed by first recoding the negative subscale items and then adding the scores to get an overall score for each participant. For the subdimensions, only the item scores of the dimension are added. Hereby, a higher overall score means the person scores higher Futures Consciousness and a higher score on a subdimension means the person scores higher on the particular dimension of FC.

**Table 3**

*Cronbach's Alpha for the FC Subdimensions*

Variable	Cronbach's $\alpha$
Time Perspective	.69
Agency Beliefs	.17
Openness to Alternatives	.69
Systems Perception	.74
Concern for Others	.79

***Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS)***

The BPNSFS is commonly used to assess different trait levels of self-determination (Van Der Kaap-Deeder et al., 2020). It demonstrates satisfactory internal consistency reliability ( $\alpha = .86$ ), good construct validity, convergent validity, and sufficient discriminant validity (Olafsen et al., 2021). The scale contains 24 items like “1. I feel a sense of choice and freedom in the things I undertake” and uses a 5-point Likert scale ranging from 1 “*not at all true*” to 5 “*completely true*”. It encompasses three subscales, considering “Autonomy”, “Competence”, and “Relatedness”. For the sample of this study, Cronbach's alpha was  $\alpha = .64$ , which indicates acceptable reliability. The reliabilities for the subscales Autonomy, Competence and Relatedness indicated acceptable internal consistency as well ( $\alpha_{\text{Autonomy}} = .80$ ;  $\alpha_{\text{Competence}} = .76$ ;  $\alpha_{\text{Relatedness}} = .81$ ). The score on the BPNSFS is computed by adding the scores to an overall score for each participant. To compute the score for the three independent needs, only corresponding items must be added together. A higher overall score means the participant scores higher on SD and a higher score on a need means they score higher on this particular need.

### ***Questionnaire for the Assessment of Personal Optimism and Social Optimism-Extended (POSO-E)***

The POSO-E-SF, which comprises a total of nine items and is divided into two subscales, is an assessment tool to measure individual differences in optimism within a person, distinguishing between personal optimism and self-efficacy optimism (Schweizer & Koch, 2001). The first subscale characterises personal optimism and includes four items, for instance, “4. I am facing my future in an optimistic way”. The second subscale consists of five items like “1. For each problem I will find a solution” and measures self-efficacy optimism. Additionally, items 5 and 7 of the POSO-E-SF are negative subscale items. The English version of the questionnaire proves to have high internal consistency ( $\alpha > .80$ ) (Schweizer & Koch, 2001; Jovanović et al., 2021). The POSO-E-SF is set up using a 4-point Likert scale scoring from 0 “*not at all true*” to 3 “*exactly true*”. For the newly acquired Dutch version of the questionnaire, a factor analysis using a one-factor model and the minimum residual method with varimax rotation, as well as a reliability analysis were conducted by adding all items that relate to personal optimism. These analyses showed a good fit of the model to the data (RMSR=.06, Fit based upon off diagonal values =.99), as well as a good level of explained variance, even though item 9 displays a negative factor loading (SS loadings = 2.03, Proportion Var =.51.) Additionally, it shows good internal consistency ( $\alpha = .80$ ). To compute the score of the personal optimism dimension of the POSO-E-SF the negative subscale items had to be reverse coded and the PO corresponding items had to be added. A higher score on the dimension means a higher score of the person on Personal Optimism.

### **Procedure**

Prior to data collection, the questionnaires mentioned above, along with an informational text and an informed consent form, were combined to measure the concepts of FC, SD, and PO. The questionnaire was published on Qualtrics (BMS - DataLab, 2024) and incorporated into the SONA platform of the University of Twente. Moreover, it was distributed through several channels of the teachers’ Microsoft Teams Working Groups and a teacher inspirational channel at Avans University. It was anticipated that by utilizing this distribution strategy, as well as convenience sampling through lectures, the intended audience, Dutch population groups of different age groups that are higher educated, would be appropriately reached, and the distribution of credit points through the SONA platform would be equitable for students at the University of Twente.

The online questionnaire was available in Dutch and took participants according to the median approximately 558 seconds to complete. The mean was 5071.1 seconds ( $SD= 25940.1$ ), indicating large differences in the duration of finishing the questionnaire. The data collection took place between April 23<sup>rd</sup> and May 19<sup>th</sup>, 2024. A link on the SONA platform directed users to Qualtrics.com (BMS - DataLab, 2024), where the questionnaire was located. As a first step of the study, the participants were provided with the initial information and the aim of the study and asked for consent. Hereby, participants could either confirm their participation or withdraw from it, which would have automatically ended the questionnaire. Secondly, they were asked to fill out questions about their demographic information. The questions about the demographic data of the participants included the age, gender, nationality, and highest degree obtained. Hereby, four options were given to choose from regarding participants' gender, namely male (including transgender men), female (including transgender women), non-binary, and prefer not to say. Thirdly, the questionnaires were filled out, and participants had the option to confirm or withdraw their initial consent after responding to the questions. They were thanked for participating in the survey and given the researchers' contact information in case there were any follow-up questions. After completion, they were awarded 0.25 SONA points if the questionnaire was accessed via SONA.

### **Data Analysis**

For the data analysis, the statistic program RStudio (2023.12.1+402). was used. First, to be able to use the data of the demographic variables, they were coded and labelled. Variables that have originally been string variables were changed to numeric variables.

Furthermore, the negative subscale items of the POSO-E-SF Scale, as well as the of the FC Scale had to be reversed coded in order to conduct further analyses, as described earlier. Following, total scores were named and computed for the scales and subscales. Moreover, the statistical assumptions of normality, linearity, independence, and equal variance were tested. Afterwards, a descriptive analysis of all demographic variables was carried out to gain insight into their means and standard deviations. Moreover, factor analyses and reliability analyses were conducted to validate the Dutch version of the FC scale, as well as the Dutch version of the POSO-E-SF questionnaire. Additionally, the reliability of the BPNSFS was evaluated for the sample. Lastly, several statistical analyses were conducted to test the assumptions, as well as to retain or reject the previously formulated hypotheses. For the assumptions, a Shapiro-Wilk test, a Pearson's chi-squared, a Durbin-Watson test, a Fligner-Kileen test, and the Residual vs. fitted plot were conducted. To test H1, H2, and H3, a descriptive analysis, Pearson's correlation,



and Spearman's rho were examined. Finally, a mediation analysis with bootstrapping, with SD (and each individual need) as independent variable, FC as dependent variable, and PO as mediator variable, was conducted to test H4. For that, the PROCESS macro (Model 4) by Preacher & Hayes, was used (Hayes, 2022).

## Results

### Preliminary Analysis

As a first part of the data analysis, the data was cleaned by deleting all missing responses. Overall, 93 participants (76.23%) finished the study, while the data of 29 participants (23.77%) had to be removed due to insufficient participation.

### Assumption testing

To evaluate the statistical assumptions of normality, independence, linearity, and equal variance, several tests were carried out. For the assumption of normality, the histograms (see Appendix B, Figures B1 to B6), as well as the boxplots (see Appendix B, Figures B7 to B12), were not normally distributed, and the Shapiro-Wilk test showed mostly significant p-values (see Table 4). Therefore, the data was not normally distributed, and the assumption of normality was violated.

**Table 4**

*Shapiro-Wilk Test*

Variable	<i>W</i>	<i>p</i>
Futures Consciousness	.99	.47
Time Perspective	.97	<.05
Agency Beliefs	.96	<.05
Openness to Alternatives	.97	.05
Systems Perception	.95	<.05
Concern for Others	.96	<.05
Self-Determination	.78	<.05
Autonomy	.97	<.05

Variable	<i>W</i>	<i>p</i>
Competence	96	<.05
Relatedness	.93	<.05
Personal Optimism	.94	<.05

The assumption of independence was tested by examining Pearson's Chi-squared and the Durbin-Watson test. For Pearson's Chi-squared significant *p*-values ( $p < .05$ ) as well as non-significant *p*-values ( $p > .05$ ) were found, indicating a partial violation of the assumption of independence (see Table 4). On the contrary, the Durbin-Watson test showed no significant autocorrelations (see Table 4).

An analysis of residual vs fitted plot was conducted to test the assumption of linearity, where clustering of the residuals could be identified (see Appendix B, Figures B13 & B14). Lastly, a Fligner-Killeen test was conducted to ensure that the assumption of equal variances was not violated. The results revealed no violation of this assumption by showing non-significant *p*-values (see Table 5).

**Table 5**

*Pearson's Chi-squared, Durbin-Watson Test, and Fligner-Killeen Test*

Test	<i>Pearson's chi squared</i>	<i>Durbin-Watson test</i>	<i>Fligner-Killeen test</i>
Variable	<i>p</i>	<i>DW</i>	<i>p</i>
Futures Consciousness ~ Self-Determination	<.01	1.96	.49
Futures Consciousness ~ Autonomy	.13	2.09	.09

Test	<i>Pearson's chi squared</i>	<i>Durbin-Watson test</i>	<i>Fligner-Killeen test</i>
Variable	<i>p</i>	<i>DW</i>	<i>p</i>
Futures Consciousness ~ Competence	.07	2.29	.78

Test	<i>Pearson's chi squared</i>	<i>Durbin-Watson test</i>	<i>Fligner-Kileen test</i>
Variable	<i>p</i>	<i>DW</i>	<i>p</i>
Futures Consciousness ~ Relatedness	<0.01	1.83	.39
Futures Consciousness ~ Personal Optimism	.68	2.10	.60
Self-Determination ~ Personal Optimism	.13	2.13	.59
Autonomy ~ Personal Optimism	.38	1.95	.76
Competence ~ Personal Optimism	.19	1.95	.83
Relatedness ~ Personal Optimism	.18	2.09	.67

For this research, a parametric test was used to analyse mediation of the models even though the assumptions of normality, and independence could not fully be met. This decision was made upon parametric tests having more statistical power and the assumption that the assumptions may not have been met because of the smaller sample size. Hereby, the mediation test used is quite robust and can still be used even though assumptions are violated (Preacher & Hayes, 2004; 2008). Nevertheless, in addition to the Pearson's correlation, Spearman's rho was tested to examine if there were large differences in outcomes.

### **Descriptive Analysis**

Descriptive analyses were conducted to illustrate the participants' scores concerning the three variables of the research model: Futures Consciousness, Self-Determination, and Personal Optimism. Additionally, descriptive analyses were conducted for subdimensions of FC (Time Perspective, Agency Beliefs, Openness to Alternatives, Systems Perception, and Concern for Others), and the needs of SD (Autonomy, Competence, and Relatedness) (see Table 6). The descriptive analyses revealed that participants had strong FC, particularly regarding Time Perspective and Systems Perception. Participants scored moderately on overall SD, as well as on the individual needs Autonomy, Competence and Relatedness. However, participants scored quite low on PO.

Moreover, the results of a correlation analysis (see Table 6), which was conducted to examine to what extent the variables were related and evaluated according to the interpretation of correlations of Mukaka (2012) (see Appendix C, Table C1). According to the analysis, Futures Consciousness and Self-Determination, as well as FC and the needs Autonomy, Competence, and Relatedness appeared to be moderately positively and significantly correlated, meaning that participants with higher scores on SD and the three independent needs also had higher scores on FC. Hence, the first hypothesis (*H1: “High levels of Self-Determination, as well as high levels of its needs Autonomy, Competence, and Relatedness are positively related to Futures Consciousness”*) could be retained. Moreover, Relatedness and PO appeared to be weakly positively related, but the relation appeared to not be significant. Additionally, overall SD and PO, Autonomy and PO, as well as Competence and PO appeared to be moderately positively correlated, meaning that people that scored higher on overall SD, Autonomy or Competence also scored higher on PO. Therefore, hypothesis 2 (*H2: “High levels of Self-Determination, as well as of the three independent needs, positively relate to the level of Personal Optimism”*) could only partially be retained. This is the case since it can be retained for SD, Autonomy, and Competence but not for Relatedness. Furthermore, FC and PO appeared to be weakly positively but not significantly related. Hence, the third hypothesis (*H3: “Personal Optimism is positively related to Futures consciousness”*) had to be rejected. By comparing the results of Pearson’s Correlation (see Table 6) with the results of Spearman’s rho (see Appendix C, Table C2), it became apparent that the differences were not substantial, which corresponded with the decision to use parametric tests for further analyses regardless of the violation of the assumptions.

**Table 6**

*Descriptive Statistics and Pearson’s Correlation Analysis*

Var	<i>M</i>	<i>SD</i>	1.	1.1	1.2	1.3	1.4	1.5	2.	2.1	2.2	2.3	3.
FC	3.84	1.04	-	.72*	.12	.76*	.81*	.70*	.42*	.49*	.49*	.48*	.09
TP	3.86	.86	-	-	-.10	.49*	.46*	.45*	.25*	.34*	.31*	.24*	-.00
AB	3.26	1.06	-	-	-	-.00	-.05	-.17	-.05	.39*	.33*	.21*	.39*

Var iabl e	<i>M</i>	<i>SD</i>	1.	1.1	1.2	1.3	1.4	1.5	2.	2.1	2.2	2.3	3.
1.3 OA	3.69	1.04	-	-	-	-	.55*	.31*	.16	.27*	.36*	.26*	.06
1.4 SP	3.93	1.08	-	-	-	-	-	.48*	.27*	.32*	.33*	.42*	.01
1.5 CO	3.81	1.02	-	-	-	-	-	-	.23*	.31*	.29*	.39*	-.07
2. SD	3.06	1.31	-	-	-	-	-	-	-	.87*	.87*	.83*	.36*
2.1 Au	3.78	.88	-	-	-	-	-	-	-	-	.65*	.53*	.36*
2.2 Co m	3.88	.81	-	-	-	-	-	-	-	-	-	.44*	.41*
2.3 Re	4.17	.79	-	-	-	-	-	-	-	-	-	-	.15
3. PO	1.77	1.09	-	-	-	-	-	-	-	-	-	-	-

*Note.* \* $p < .05$ . Futures Consciousness (FC). Time Perspective (TP). Agency Beliefs (AB). Openness to Alternatives (OA). Systems Perception (SP). Concern for Others (CO). Self-Determination (SD). Autonomy (Au). Competence (Com). Relatedness (Re). Personal Optimism (PO).

### Mediation Analysis

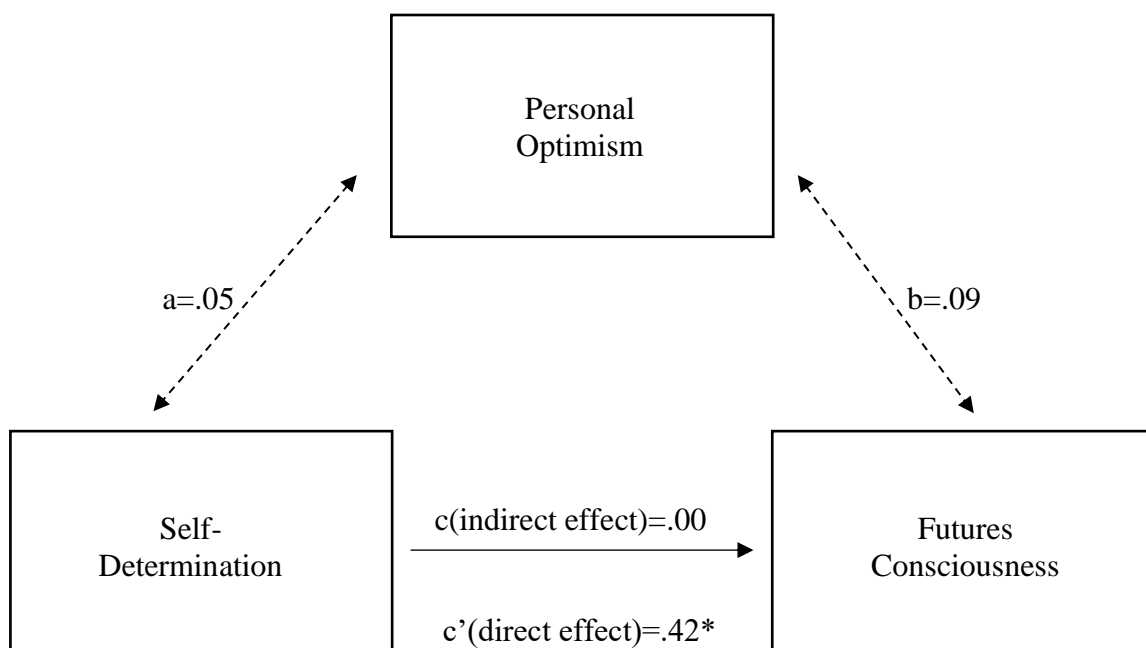
To test the fourth hypothesis (*H4*: “*Personal Optimism mediates the relationship between Self-Determination, as well as the three independent needs, and Futures Consciousness*”), a mediation analysis between the independent variable (IV) Self-Determination, as well as each of its independent needs, the dependent variable Futures Consciousness, and the mediator variable Personal Optimism was conducted. The results suggest that SD is not a significant predictor of PO due to low explained variance in PO by SD (see Appendix D, Table D1). Additionally, the results showed a moderate positive correlation between SD and FC, and SD and PO account for a small proportion of variance in FC.

Moreover, there was a statistically significant positive relationship between FC and at least one of the variables SD and PO. Furthermore, there is a statistically significant positive effect of SD on FC. However, the results showed that there was no statistically significant indirect effect of the variable PO on the relationship between SD and FC. Similarly, the outcomes of the model examining each of the needs of SD (Autonomy, Competence, and Relatedness) revealed no significant mediation effect of PO on the relationship between each independent need and FC (see Appendix D, Table D2 to D4).

Hence, the fourth hypothesis (*H4*: “*Personal Optimism mediates the relationship between Self-Determination, as well as the three independent needs, and Futures Consciousness*”) had to be rejected due to the missing mediation effect of PO in all models.

### Figure 5

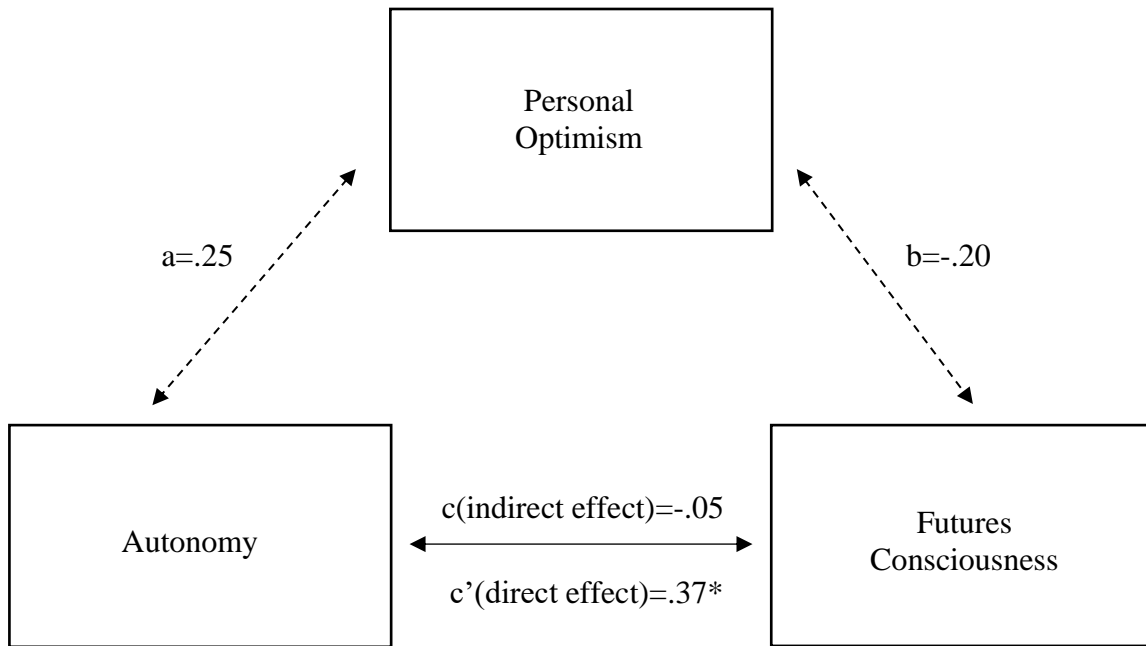
*General Model of Research with Path Coefficients*



*Note.* Standardized coefficients.  $c'$  = direct effect of X on Y.  $c$  = combined effect of direct and indirect effect of X on Y. Solid lines represent significant effects.  $*p < .001$ .  $R^2_{\text{mediation model}} = .00$ .  $R^2_{\text{DV model}} = .09$ .

### Figure 6

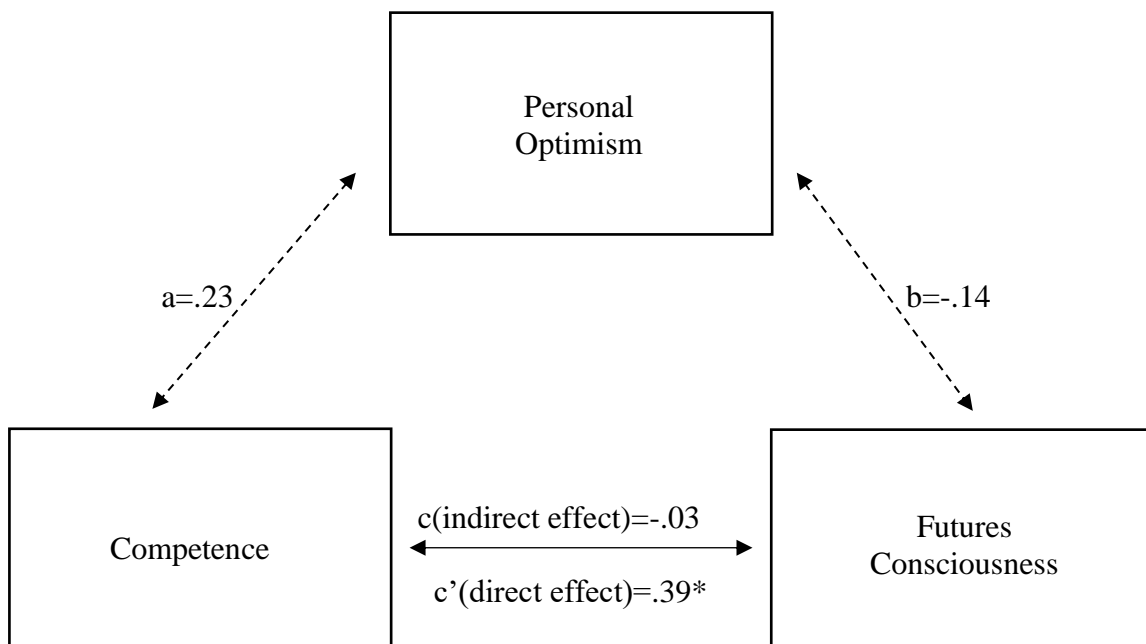
*Model including Autonomy with Path Coefficients*



*Note.* Standardized coefficients.  $c'$  = direct effect of X on Y.  $c$  = combined effect of direct and indirect effect of X on Y. Solid lines represent significant effects.  $*p < .001$ .  $R^2_{\text{mediation model}} = .20$ .  $R^2_{\text{DV model}} = .26$ .

**Figure 7**

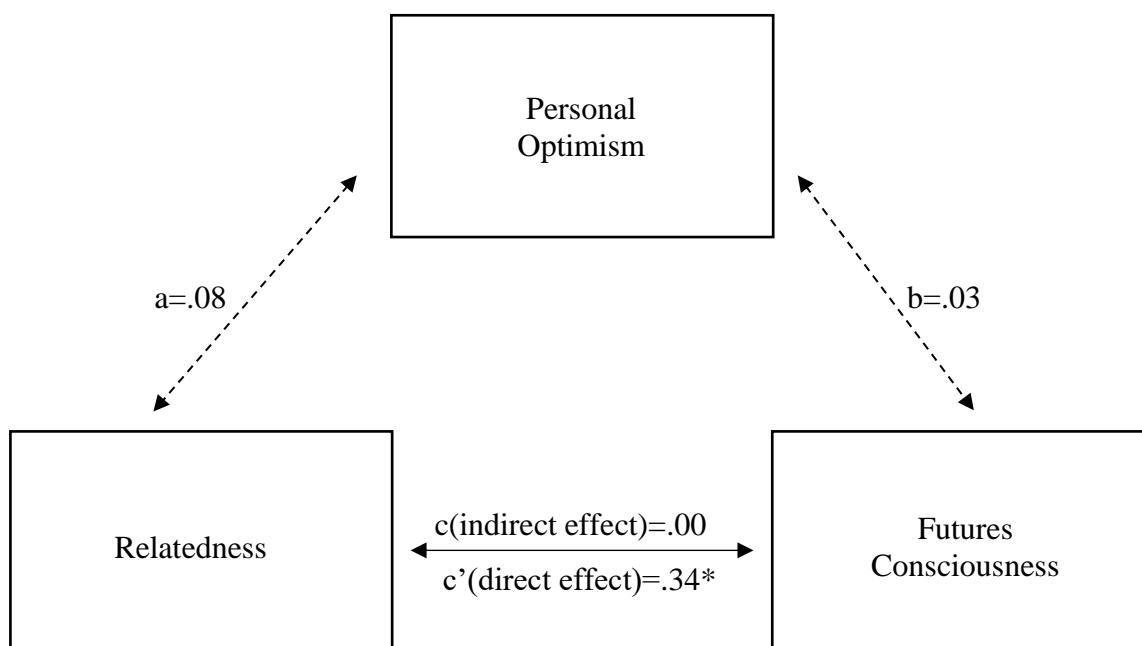
*Model including Competence with Path Coefficients*



*Note.* Standardized coefficients.  $c'$  = direct effect of X on Y.  $c$  = combined effect of direct and indirect effect of X on Y. Solid lines represent significant effects.  $*p < .001$ .  $R^2_{\text{mediation model}}=.14$ .  $R^2_{\text{DV model}}=.25$ .

**Figure 8**

*Model including Relatedness with Path Coefficients*



*Note.* Standardized coefficients.  $c'$  = direct effect of X on Y.  $c$  = combined effect of direct and indirect effect of X on Y. Solid lines represent significant effects.  $*p < .001$ .  $R^2_{\text{mediation model}}=.02$ .  $R^2_{\text{DV model}}=.23$ .

### Discussion

This study aimed to examine the relationship between Futures Consciousness and Self-Determination, as well as its individual needs, taking Personal Optimism into account. More specifically, the main objective was to investigate if Personal Optimism mediates the relationship between Futures Consciousness and Self-Determination, as well as its individual needs. Hereby, the needs of SD are significantly related to FC. PO is not significantly related to FC, therefore there is no mediating effect of PO on the relationship between SD and FC. In the following, the main findings will be discussed.



The first hypothesis, predicting that high levels of SD as well as high levels of each need (Autonomy, Competence, and Relatedness) are positively related to FC could be retained. The current finding corresponds with the research of Ahvenharju et al., (2018, 2022), and Sools (2020), who connect the dimensions of FC to the current behaviour of people. This, in turn, can be connected to Self-Determination which predicts the motivation, behaviour and wellbeing of people (Deci & Ryan, 2015). Hereby, overall SD had a slightly weaker relation to FC as Autonomy, Competence, and Relatedness, which might account for the complexity of the multidimensionality of SD. Several subdimensions of FC, for instance Agency Beliefs and Openness to Experience had weaker relations to overall SD as well, accounting for the complexity of the multidimensionality of FC. Therefore, scoring higher on Autonomy cannot be connected to scoring higher on Agency Beliefs, meaning participants' intrinsic motivation to act regarding the future is likely to relate to another factor than Autonomy (Deci & Ryan, 2015). On the contrary, the need of Relatedness, which is connected to the FC subscale Concern for Others, is moderately related to FC. Thus, participants might make more meaning of the feedback from others and their feeling of being related to others, which ultimately might strengthen their extrinsic motivation to take action regarding the future (Deci & Ryan, 2015).

Further, the second hypothesis, predicting that high levels of Self-Determination as well as of the three independent needs positively relate to the level of Personal Optimism, could only be retained partially. Hereby, the relation between overall SD and PO, Autonomy and PO, and Competence and PO, was moderate. Nevertheless, there was no relation between Relatedness and PO, which is in line with Personal Optimism not specifically implying Relatedness (Ahvenharju et al., 2021). These findings are in order with the connection of motivation, self-efficacy and optimism that is based on the research of Lombardo (2007).

Moreover, the third hypothesis, predicting that Personal Optimism is positively related to Futures Consciousness, could not be retained since PO and FC were not related significantly. However, Agency Beliefs is the only dimension of FC that appeared to be significantly related to PO. This draws a connection between Personal Optimism and Agency Beliefs of FC since being optimistic enforces the trust in the own abilities to influence the future. Additionally, in line with the findings of Locke (2000) and Lombardo (2007), it connects to the trust one has regarding influencing the personal future, that is fostered through optimism. Nevertheless, the nonsignificant relation of overall FC and PO corresponds with the complex relation of Personal Optimism and FC that has been stressed in the research of Ahvenharju et al. (2021).

Lastly, the fourth hypothesis, predicting that Personal Optimism mediates the relationship between Self-Determination, as well as the three independent needs, and Futures

Consciousness, had to be rejected. This corresponds with the aforementioned relations of SD, as well as Autonomy, Competence, and Relatedness, FC, and PO. Hereby, PO only has significant relations to overall SD, Autonomy and Competence, but does not have significant relations to Relatedness or FC. Hence, PO does not have an influence on the relationship between the independent and the dependent variable.

Due to the aforementioned results, especially looking at Agency Beliefs and Concern for Others in connection with Competence and Relatedness and that PO does not relate to FC, it can be hypothesised that optimism in a social sense might have a larger impact on the relationship of SD and FC in Dutch population groups than PO. Hence, it can be hypothesised that need satisfaction, in the sense of Autonomy, Competence, and Relatedness, can rather be connected to optimism in a societal sense.

### **Strengths and Limitations of the Current Study**

When looking back at the study, there are certain strengths and limitations that must be considered. Firstly, looking at the fast changes in today's society and the amount of uncertainty existent when thinking of the future, it seems crucial to investigate how people are seeing the future and try to shape it by adapting their behaviour accordingly. This study therefore contributed to this knowledge through examining the relation of Self-Determination and Futures Consciousness, especially looking at the role of Personal Optimism.

Another strength of the study is that it used validated English scales, as the Futures Consciousness Scale (FCS), the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS), and the short form of the Questionnaire for the Assessment of Personal Optimism and Social Optimism-Extended (POSO-E-SF), which were then translated into Dutch using backwards translation, and using factor analyses and reliability tests to assess the psychometric characteristics of the scale, which, apart from the reliability of Agency Beliefs, proved to be good. Nevertheless, participants indicated that for some questions it was quite difficult to relate them to their daily experience and to grasp the meaning of the questions since some of them appeared to be too abstract, which is likely to have influenced their responses to the survey questions. This might especially be the case for the items of Agency Beliefs, since the reliability of those was rather low.

Another limitation that must be considered is that the Dutch version of the FC Scale and the POSO-E-SF could not be officially validated due to the sample size of the study ( $N=93$ ), while the sample size was adequate for this research's purposes. Moreover, looking at the highest obtained diploma of the participants, it can be stated that the sample is, as intended,

rather educated. This is a limitation resulting from the used convenience sampling method and the used ways of distribution of the study, which might therefore be an indication that the sample might only represent educated Dutch population groups but not represent broader Dutch population groups.

Furthermore, the duration the participants needed to fill out the questionnaire significantly differed for some participants ( $SD_{duration\_in\_seconds} = 25940.11$ ) with some filling out the questionnaire rather quickly while others took a long time to fill out the questionnaire, which might have had an influence on the results. However, to ensure the validity of the results, non-parametric tests were used in addition to parametric tests. For the mediation analyses, the study used statistical tests that are robust against assumption violation, further ensuring the validity of the results.

### **Implications for Future Research and Practice**

The results of this research favourably impact our comprehension of how Self-Determination might affect Futures Consciousness and that Personal Optimism does not mediate this relationship. Taking the strengths and limitations of this study into account, it is essential to conduct further research on this topic to be able to examine if there might be significant results under different research conditions or relationships with other variables that explain some variance in the relationship. Therefore, some implications for future research should be considered.

Firstly, for further use of the Dutch version of the FC Scale and the POSO-E-SF, the scales should be validated using a sample that is larger and heterogenous. Hence, probability sampling instead of non-probability sampling should be used to ensure a randomisation of the data and therefore also a rather heterogenous sample from the population. Additionally, the scales should be revised again and tested before collecting the actual data to ensure the items are easy to understand and relatable, other than indicated by the participants of this study, and hence could not be understood in a wrong matter. Generally, a pre-test of the scales would improve the scale validation procedure. Hereby, even though participants indicated that some questions were hard to relate to their daily experiences, most items adequately related to the factors, showing participants might still have understood most questions in the right sense. Still, the reliability analysis did show that some of the FC items need to be revised to ensure high reliability scores, especially looking at the low reliability score of agency beliefs.

Moreover, further investigation should be conducted on which other variables might play a role in the relationship of SD and FC. Correspondingly, further research should be

conducted on which variables, other than the needs of SD, are closely related to intrinsic and extrinsic motivation and might play a role in the relation to Futures Consciousness. A variable to look deeper into is for instance resilience, which might give deeper insight into motivation in the relationship of FC and SD (Ryan & Deci, 2000). Additionally, it could be investigated which other concepts might be related to Agency Beliefs of FC, since it does not seem to be significantly related to Autonomy as hypothesised and proved to have a more complex relation with optimism. Hereby, a variable to investigate could be Locus of Control, as it is already connected to Agency Beliefs of FC and therefore might play a role in the relationship between SD and FC (Ahvenharju et al., 2018, 2021). However, it is important to investigate this further while ensuring high reliability of Agency Belief in further research. Furthermore, the multidimensionality of FC and SD could be further investigated in terms of which dimensions might be interrelated to further understand the motivational factors in Futures Consciousness in people.

Ultimately, in further research, it could be investigated if the relation of SD and FC differs for different generational groups, for instance taking younger people like students, and older people that are already more settled into account. Another idea for further research would be to examine the differences in Futures Consciousness in terms of overall optimism in groups that have a voice in future global politics and groups that are normally less heard, taking potential resulting empowerment into account.

As this research revealed that FC and SD are related in a complex way that still needs to be explored further by conducting futures studies, in practice there could for instance be focus groups with a wide sample of Dutch population groups. This sample should then be gathered through non-probability sampling, to examine which other concepts the participants think relate to their personal FC. By gathering more information about further factors involved, in the future, there could be interventions targeted at enhancing peoples' FC and therefore enabling them to engage in proactive behaviour that is targeted at their personal futures. For instance, these findings could be implicated in practice by further exploring how students can be empowered to engage in FC by helping them to recognise their needs. Furthermore, looking at companies, it could be crucial to consider the need satisfaction of the employees, in terms of a feeling of autonomy, competence, and relatedness in the workplace, to foster FC and therefore for example innovativeness.

## **Conclusion**

The importance of this research lies in the increasing global complexity and increasing speed of change as well as disruption, which have an influence on the level of consciousness people have regarding their future. This study provided valuable insight into the relationship between Self-Determination and Futures Consciousness, indicating that having higher levels of SD related to having higher levels of FC. Therefore, by increasing peoples' need satisfaction in terms of Autonomy, Competence, and Relatedness, Futures Consciousness might be fostered accordingly. Personal Optimism did not relate to FC and therefore did not mediate the relationship between SD and FC, highlighting the significance to conduct further studies about the complex role of optimism in this relationship.

Additionally, future research should consider the sample size, the sampling method, validation of the Dutch scales, as well as to take additional variables into account, which might provide deeper insight into the relationship between Self-Determination and Futures Consciousness. This could be done by involving people directly, gathering their personal view on Futures Consciousness and connected factors further to ultimately enhance their futures consciousness and therefore their engagement in proactive behaviour.

To conclude, to foster personal and perhaps even societal change, it appears crucial to foster consciousness about the upcoming future. This, in turn, influences peoples' behaviour in the present to reach a certain future. To deepen our understanding of the complex role of optimism in the relationship of SD and FC, it is highly important to further investigate possible relations of optimism and FC. Ultimately, it is essential to develop corresponding interventions to foster peoples' engagement in proactive behaviour regarding their future and thus, create change.

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## Appendix A

### Dimensions of the FC Scale

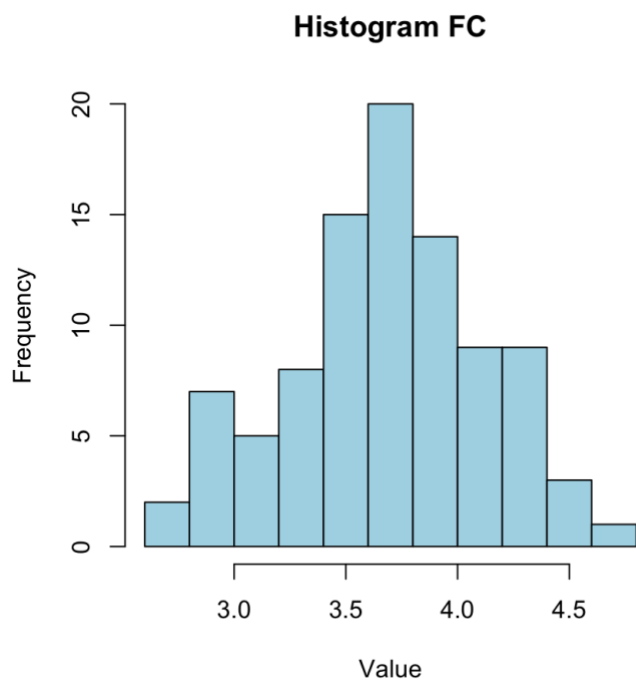
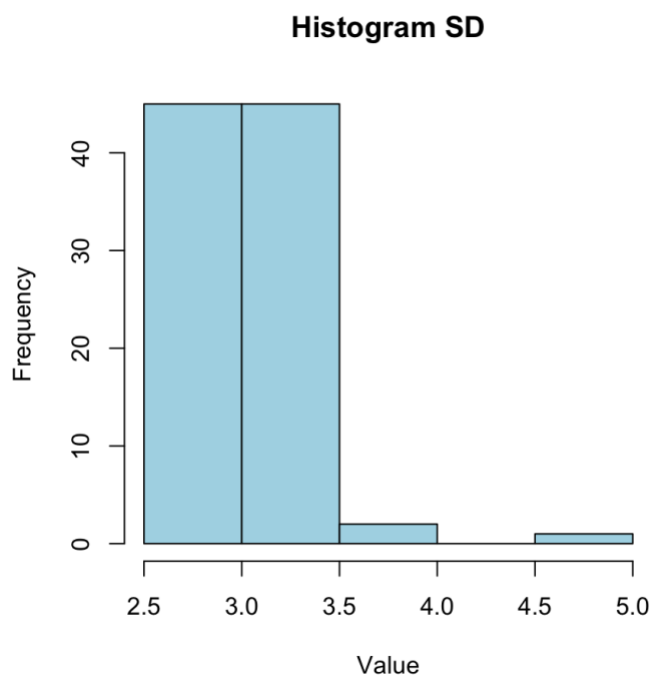
**Figure A1**

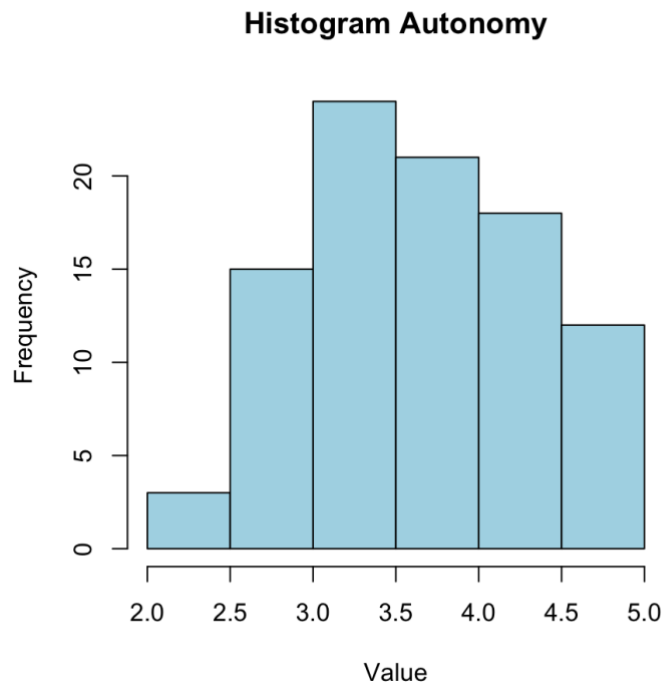
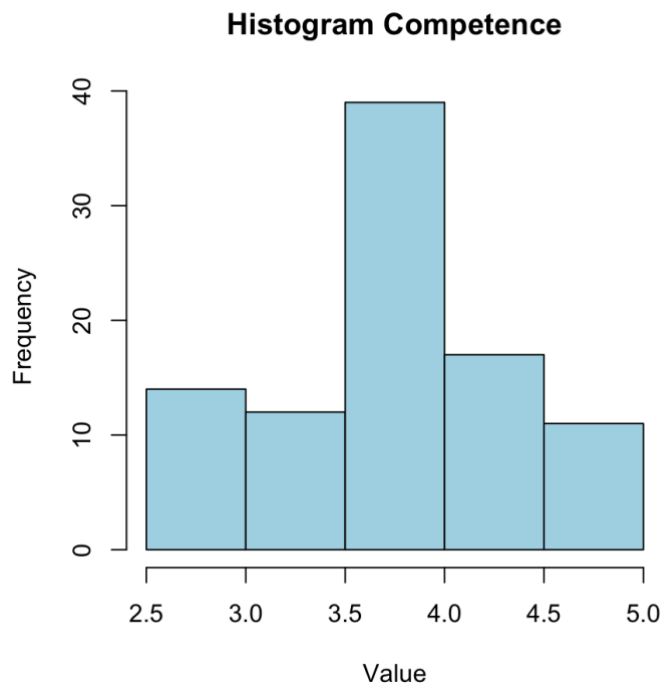
*Five Dimensions of the FC Scale according to Ahvenharju et al. (2021)*

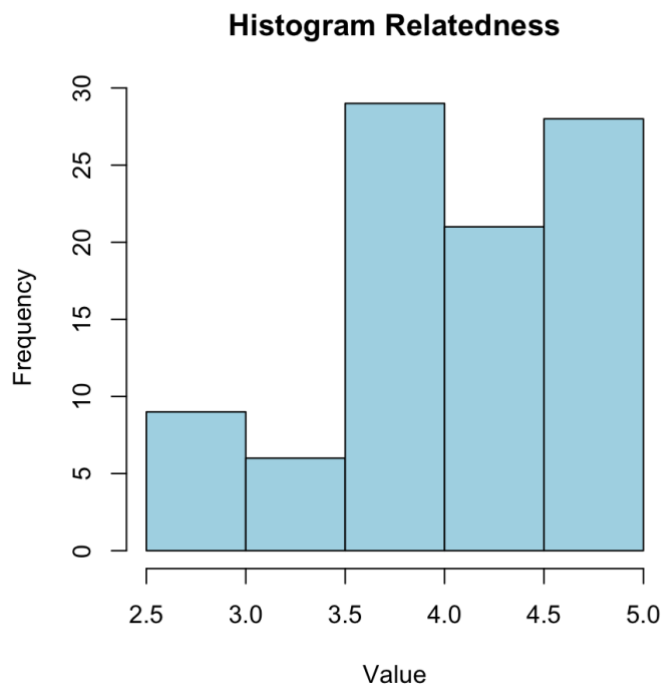
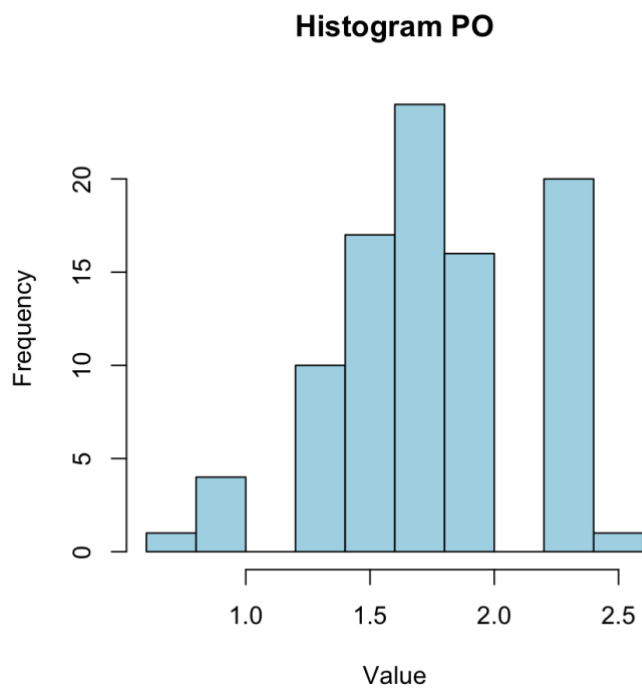
DIMENSION	DESCRIPTION	PSYCHOLOGICAL CONSTRUCTS	KEY ASPECTS	OPPOSITE	EXAMPLES
<b>Time Perspective</b>	<i>How much we orient ourselves towards the future.</i>	Future Orientation  Consideration of Future Consequences	Recognizing the value of long-term thinking in planning/social development.  Being aware of consequences and impacts of actions over time.	Short-term thinking  Disregard for consequences	Deferring gratification to get long-term benefits.  Foreseeing future problems and trying to prevent them.
<b>Agency Beliefs</b>	<i>How much we trust in our ability to influence how the future unfolds.</i>	General Self-Efficacy  Locus of Control  Optimism	Recognition of our ability to act (active agency).  Recognition of where action can be taken or efforts yield results.  Strong belief that our actions can influence outcomes.	Belief that the future cannot be influenced  Passivity or a reactive attitude	Aspirational and entrepreneurial behavior.  Acting with self-confidence and determination.
<b>Openness to Alternatives</b>	<i>How much we critically question established truths and our openness to how different the future can be.</i>	Openness to Experiences  Critical Thinking	Recognizing the potential of a plurality of possible futures.  Thinking critically and questioning present ways of doing things.	Viewing the future as closed, deterministic and controllable.  Accepting established truths and relying on authorities for facts.	Pioneering attitude or "fighting against windmills".  Resisting the polarizing effects of social media, breaking out of "siloe thinking".
<b>Systems Perception</b>	<i>How easily we see how human and natural systems are interconnected and recognize the complex consequences of decisions.</i>	Systems Thinking  Ecopsychological Self	Recognition of the roles of causality and complexity.  Understanding of ones position and significance within broader natural systems.	Attempting to foresee every impact and consequence  Disregard for the impacts of human behavior to the natural systems.	Choice conscious selection of services, products and organizations.  Environmentally conscious human behaviour.
<b>Concern for Others</b>	<i>How much we have broadened our moral and ethical values to include physically or temporally distant people.</i>	Self-Transcendence Values  Identification with All Humanity	Willingness to give something away to make the world a better place.  Understanding how every person and place are linked together.	Dispassionate observation  Self-interestedness	Engaging in altruistic community activities.  Considering the needs of future generations.

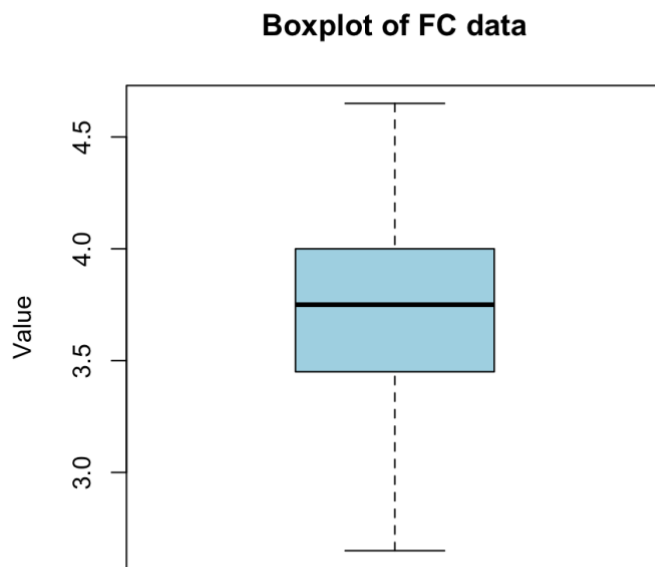
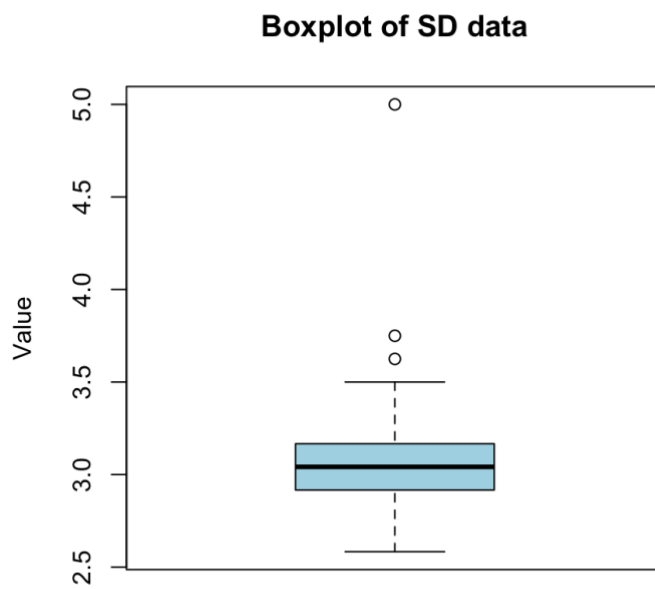
## Appendix B

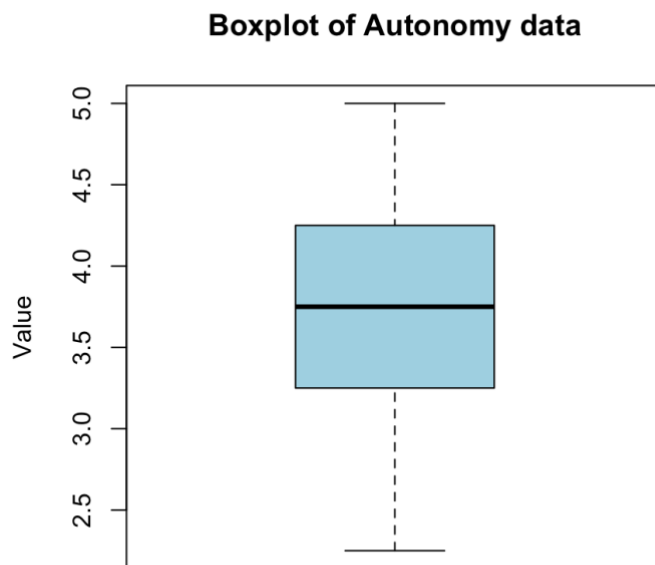
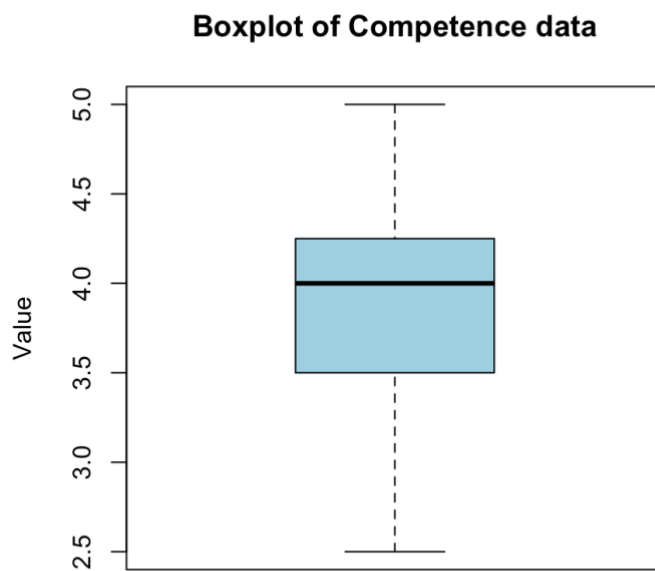
### Histograms and Boxplots

**Figure B1***Histogram FC***Figure B2***Histogram SD*

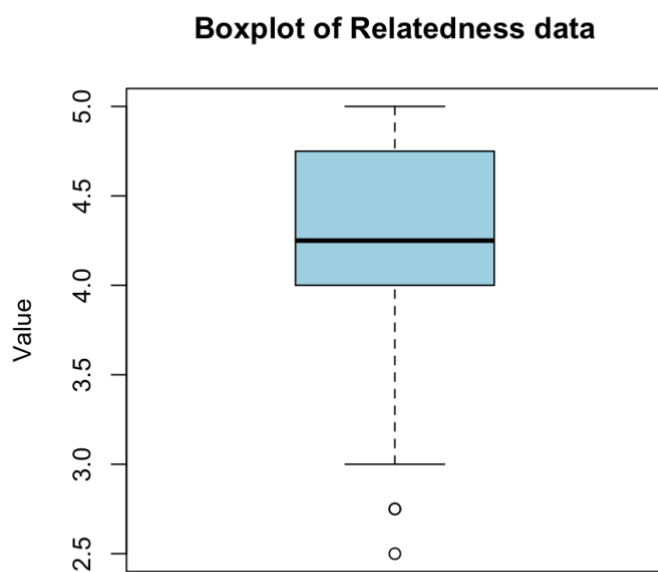
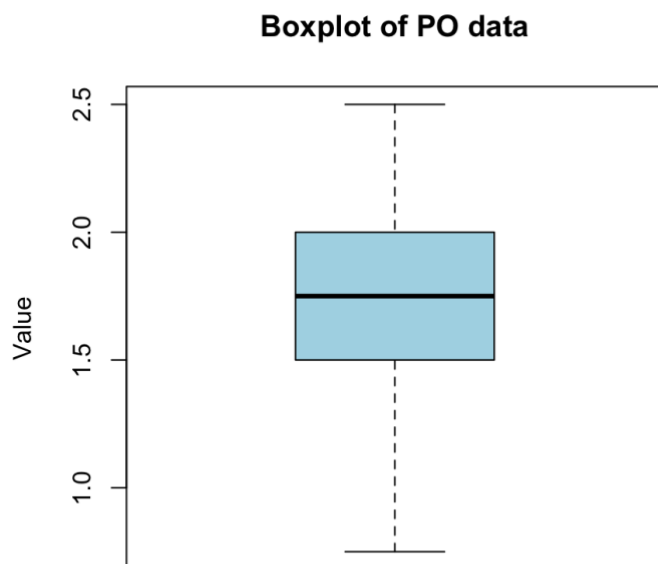
**Figure B3***Histogram Autonomy***Figure B4***Histogram Competence*

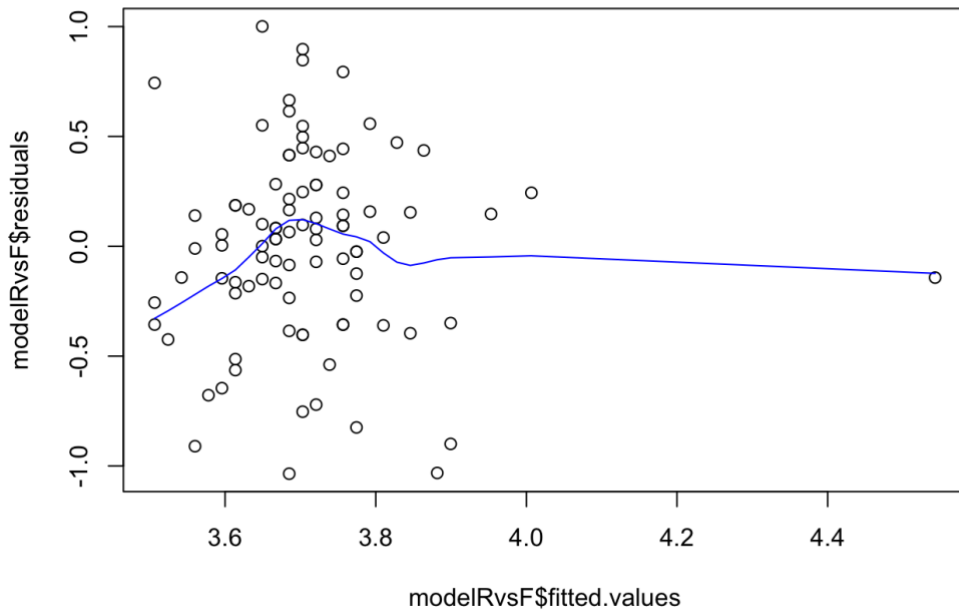
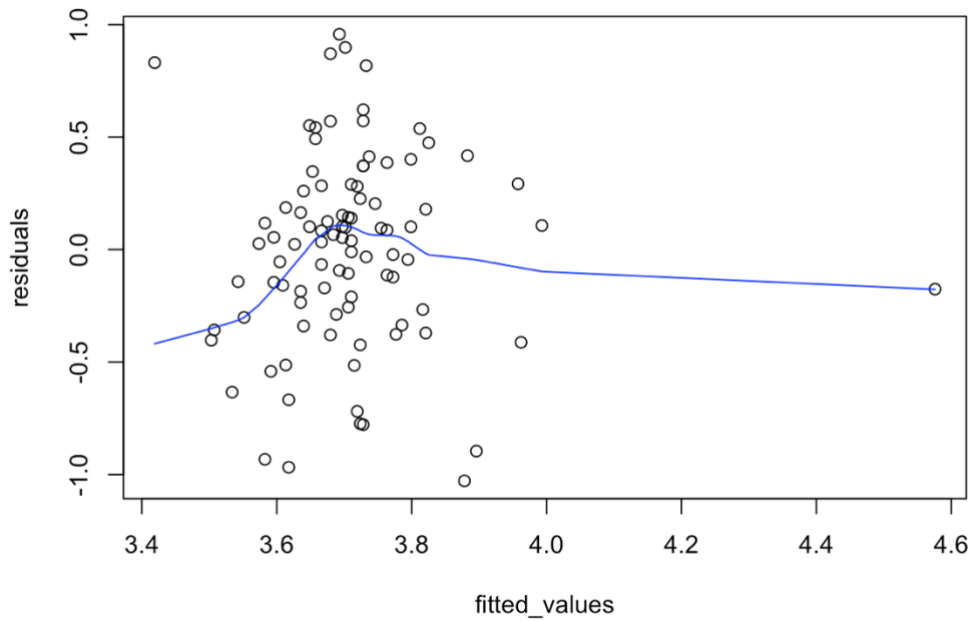
**Figure B5***Histogram Relatedness***Figure B6***Histogram PO*

**Figure B7***Boxplot of FC data***Figure B8***Boxplot of SD data*

**Figure B9***Boxplot of Autonomy data***Figure B10***Boxplot of Competence data*



**Figure B11***Boxplot of Relatedness data***Figure B12***Boxplot of PO data*

**Figure B13***Residual vs. Fitted Plot including FC and SD***Figure B14***Residual vs Fitted Plot including FC, SD, and PO*

**Appendix C**  
**Interpretation of Correlations and Spearman's Rho**

**Table C1***Interpretation of Correlations*

Size of Correlation	Interpretation
.90 to 1.00 (-.90 to -1.00)	Very high positive (negative) correlation
.70 to .90 (-.70 to -.90)	High positive (negative) correlation
.50 to .70 (-.50 to -.70)	Moderate positive (negative) correlation
.30 to .50 (-.30 to -.50)	Low positive (negative) correlation
.00 to .30 (.00 to -.30)	Negligible correlation

*Note.* Adopted of the research of Mukaka (2012) (pp. 69-71)



**Appendix D**  
**Results of the Mediation Analyses**

**Table D1**

*Mediation output for effect of PO on the relation between SD and FC*

Predictor	B	SE	t	p	95% CI	
					LL	UL
Outcome variable: PO						
Constant	1.60	.41	3.92	<.001*	.79	2.41
SD	.06	.13	.41	.68	-.21	.32
Model Summary: $R=.04$ , $R^2=.00$ , $F(1, 91)=.17$ , $p=.68$						
Outcome variable: FC						
Constant	2.26	.50	4.50	<.001*	1.26	3.25
SD	.42	.15	2.81	.01	.12	.72
PO	.09	.12	.74	.46	-.15	.33
Model summary: $R=.30$ , $R^2=.09$ , $F(2,90)=4.31$ , $p=.02$						
Direct and indirect effects						
Direct effect of SD on FC	.42	.15	2.81	.01	.12	.72
Indirect effect via PO	.01	.03			-.09	.05

**Table D2***Mediation output for effect of PO on the relation between Autonomy and FC*

Predictor	B	SE	t	p	95% CI	
					LL	UL
Outcome variable: PO						
Constant	.84	.20	4.22	<.001*	.44	1.23
Au	.25	.05	4.78	<.001*	.14	.35
Model Summary: $R=.45$ , $R^2=.20$ , $F(1, 91)=22.88$ , $p<.001^*$						
Outcome variable: FC						
Constant	2.67	.25	10.81	<.001*	2.18	3.17
Au	.37	.07	5.54	<.001*	.23	.50
PO	-.20	.12	-1.63	.11	-.43	.04
Model summary: $R=.51$ , $R^2=.26$ , $F(2,90)=15.81$ , $p<.001^*$						
Direct and indirect effects						
Direct effect of Au on FC	.37	.07	5.54	<.001*	.23	.50
Indirect effect via PO	-.05	.03			-.12	.02

**Table D3***Mediation output for effect of PO on the relation between Competence and FC*

Predictor	B	SE	t	p	95% CI	
					LL	UL
Outcome variable: PO						
Constant	.86	.24	3.60	<.001*	.38	1.33
Com	.24	.06	3.89	<.001*	.12	.35
Model Summary: $R=.38$ , $R^2=.14$ , $F(1, 91)=15.13$ , $p<.001^*$						
Outcome variable: FC						
Constant	2.42	.28	8.61	<.001*	1.86	2.98
Com	.39	.07	5.46	<.001*	.25	.54
PO	-.14	.12	-1.18	.24	-.37	.09
Model summary: $R=.50$ , $R^2=.26$ , $F(2,90)=15.35$ , $p<.001^*$						
Direct and indirect effects						
Direct effect of Com on FC	.39	.07	5.46	<.001*	.25	.54
Indirect effect via PO	-.03	.03			-.10	.03

**Table D4***Mediation output for effect of PO on the relation between Relatedness and FC*

Predictor	B	SE	t	p	95% CI	
					LL	UL
Outcome variable: PO						
Constant	1.43	.27	5.34	<.001*	.90	1.96
Re	.08	.06	1.29	.20	-.04	.021
Model Summary: $R=.13$ , $R^2=.02$ , $F(1, 91)=1.66$ , $p=.20$						
Outcome variable: FC						
Constant	2.23	.32	6.92	<.001*	1.59	2.87
Re	.34	.07	5.12	<.001*	.21	.48
PO	.03	.11	.25	.81	-.19	.25
Model summary: $R=.48$ , $R^2=.23$ , $F(2,90)=13.55$ , $p<.001^*$						
Direct and indirect effects						
Direct effect of Re on FC	.34	.07	5.12	<.001*	.21	.48
Indirect effect via PO	.002	.01			-.02	.03