Investigating the Association between Extraversion and Happiness - an Experience Sampling Study

Master Thesis

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25 - 08 - 2021

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Author Note

This study is a post-hoc analysis of data used in Frielingsdorf (2020)

Abstract

Objective

Studies about personality traits and affect show that extraversion and happiness appear to be strongly linked together. The problem with research into those constructs is that most studies predominantly investigate them as stable expressions at the trait-level. Thus, the present study aims to give new insights into how extraversion and happiness are associated at the state level.

Method

To analyze these associations in daily life, the present study uses the experience sampling method (ESM). The data discussed in this study was collected from a sample of 37 participants, mostly university students, who each reported their extraversion and happiness levels daily. Linear mixed models with a nested autoregressive covariance structure and Pearson correlations were used to investigate the connections between trait, state and average state levels of extraversion and happiness.

Findings

A weak and non-significant relationship was found between trait extraversion and average state happiness ($r = 0.12$; $p = .470$). Further, the association between the averages of state extraversion and state happiness was found to be strong and significant ($r = .586$, $p < .001$), while a non-significant association was revealed between average extraversion and trait happiness ($r = .440$, $p = .004$). Finally, the state measurements of extraversion and happiness were investigated and revealed a strong and significant association within the sample ($\beta = .44$; SE = .21; $p < .001$; 95% CI [.40, .48]).

Conclusions

The findings imply that feeling more extraverted in a given moment is associated with higher levels of happiness. More importantly, this is true while the trait level of extraversion has no significant association with happiness levels. So, being an introvert or being an extravert makes no significant difference in this association. This means that acting like an extravert, whether you are one or not, predicts higher levels of happiness.

Investigating the Association between Extraversion and Happiness - an Experience Sampling Study

With the current covid-19 pandemic and ensuing protective measures such as lockdowns, happiness levels worldwide are reportedly on the decline (Greyling, Rossouw & Adhikari, 2020). But not everyone is affected to the same degree and one's personality appears to play an important role. Studies show that those who enjoy spending time with others more, suffer to a greater extent than those who prefer to be alone (Wijngaards, de Zilwa & Burger, 2020). The problem with research into extraversion and happiness is that most studies predominantly investigate both constructs as stable expressions at the trait-level (e.g. Francis et al., 1998; Hills & Argyle, 2001). Consequently, measurements are usually conducted as one-time questionnaires that might inquire about extensive periods of time, which can lead to some issues. Answers are necessarily based on memory and run the risk of being biased (Schimmack & Diener, 2003).

While trait-level analyses help to explain differences between people, they give no implications for momentary fluctuations in daily life (Fleeson, 2004). This information can only be retrieved when considering the state levels of the constructs and many studies have pointed at the importance of considering personality and happiness from a more dynamic point of view (Fleeson, 2004; Howell et al., 2017). The state level of a construct such as extraversion can be analyzed utilizing methods such as the experience sampling method (Kahneman, 1999). By applying the experience sampling method and repeatedly measuring state-levels of extraversion and happiness in participant's daily lives, this study aims to deepen the understanding of how these two constructs are related to one another as they occur naturally in the context of daily life.

Extraversion

Extraversion is a term most often used for a personality trait that includes a number of typically performed behavioural patterns such as sociability, excitement seeking and the experience of positive emotions (Wilmot et al., 2019). An archetypal extravert would thus be someone who is talkative, gregarious, expresses positive emotions and prefers stimulating activities. (John, Naumann, & Soto, 2008 retrieved from Wilmot et al., 2019).

The most commonly used extraversion-introversion scale is the Big Five Model of personality, yet it is a central part of all notable theories and models of personality (McCrae & Costa, 1987; Wilmot et al., 2019). Across most studies, trait extraversion scores have

moderate test-retest reliability and evidence suggests that all existing measures tap a common underlying construct. Research found trait extraversion to be heritable and scores tend to increase over one's lifetime during adolescence, later stabilizing during adulthood (Wilmot et al., 2019).

While the trait level refers to how a person is characterized more in general and over longer periods of their lifetime (Fleeson, 2001), the state level meanwhile refers to how much a person acts out these trait-tendencies in any specific situation at any given time. For instance, someone can be described as an extravert in trait terms, yet they can experience fluctuating expressions of state extraversion depending on the situations they are in on a daily basis (Fleeson, 2001).

Happiness

Even ancient Greek philosophers such as Aristotle and Epicurus pondered about the nature of human happiness (Hills & Argyle, 2001). In today's scientific literature, the term happiness is most often discussed as one of the two parts of well-being (Tan, Low & Viapude, 2018). The most commonly used taxonomy of well-being splits it across two domains and happiness is one of those.

Following that taxonomy, trait happiness is defined as the stable experience of life satisfaction, positive affect, and the lack of negative affect (Diener, 2000). Trait happiness is stable over time, responds to changes in life events, and predicts longevity (Chopik & Lucas, 2019). It pertains to a combination of an individual's overall appraisal of the positivity in their life and the balance between different affective states (Diener, 1984 retrieved from Chopik & Lucas, 2019). Veenhoven (2013) dove deep into the implications of this definition of happiness and underlined the differences between life satisfaction and affective states. While life satisfaction requires a certain level of cognitive evaluation and reflection, affective states are mostly passively experienced and can only be influenced indirectly (Veenhoven, 2013).

State happiness meanwhile is the in-the-moment variant of trait happiness (Veenhoven, 2013). It has been shown to be extremely context-dependent, as relatively minor events such as finding change or the outcome of a football game can substantially impact reports of life satisfaction (Schwarz, 1987; Schwarz et al., 1987). Also, given the cognitive component of happiness, some individuals might be even more receptive to contextual influences than others or might unknowingly use mental heuristics, thus altering their evaluations of life satisfaction (Chopik & Lucas, 2019).

Extraversion and Happiness

Many early studies found that extraversion is connected to higher levels of happiness (Furnham & Brewin, 1990; Francis et al., 1998). Some, such as Eysenck (1983), even went so far as to define (trait) happiness as stable extraversion, yet more recent findings paint a more complex picture of the connection between the two constructs. Across the current research, trait happiness and trait extraversion are usually associated with correlation coefficients of about 0.45, which indicates low to moderate levels of correlation (Hills & Argyle, 2001).

Yet, the relationship at the state level is less researched. Momentary behaviours that people carry out in daily life are highly variable and thus not necessarily predictable by their trait, but it is possible to predict their typical way of acting (Fleeson, 2004). In line with this, newer studies indicate that extraverts naturally gravitate towards social activities that increase their happiness levels, yet this does not mean they always carry these out all the time (Watson et al., 1992; Hills & Argyle, 2001; Tan et al., 2018). This propensity towards sociability can be explained by the fact that typical extraverts tend to be energetic, assertive, and enthusiastic (John, Naumann, & Soto, 2008 retrieved from Tan et al., 2018). If the characteristics of both constructs are compared side by side, the connection becomes more apparent. Extraverts are typically sociable, experience many positive emotions and seek excitement, while happiness consists of life satisfaction, positive affect, and decreased levels of negative affect (Diener, 1984 retrieved from Chopik & Lucas, 2019; Wilmot et al., 2019).

Conceptualizations of the Relationship between Extraversion and Happiness

Many different models were created to explain how state and trait levels of personality are associated with happiness. Early studies proposed two different models: the temperament model and the instrumental model. In line with what Fleeson (2004) found about the impact of traits on behavioural trends, the instrumental model suggests that different personality traits are associated with different behaviours and circumstances which in turn are associated with affective experiences (Mccrae & Costa, 1991). For example, a typical extravert gravitates towards social engagement which in turn is associated with positive affect (Watson et al., 1992; Hills & Argyle, 2001). Furthermore, the temperamental model states that personality traits are connected to happiness through their inherent connection to affective experiences. For instance, extraversion appears to be linked to positive affect, as extraverts are more sensitive to rewards (Letzring & Adamcik, 2015).

A more recent model is the dynamic mediation model, which combines aspects from both of the previous models (Wilt et al., 2012; Howell et al., 2017). According to this model, trait personality influences happiness in three dynamic ways. Firstly, each personality trait is associated with an increased propensity to enact specific daily behaviours. Secondly, enacting those trait-specific behaviours associated with the respective personality states leads to an increase in positive emotions and a decrease in negative emotions. Thirdly, this accumulation of positive emotions and the decrease of negative emotions leads to an indirect increase in overall happiness (Wilt et al., 2012). Yet, it is important to remember that this model only accounts for trends and daily levels of happiness are still subject to situational influences (Fleeson, 2004; Schwarz, 1987; Schwarz et al., 1987). Following the dynamic mediation model, extraverts are happier because they more often enact extravert behaviour, which in turn leads to positive emotions. The frequent experience of those positive emotions then leads to an increase in overall happiness (Howell et al., 2017).

Within- And Between-Person Differences

Data that is collected at one single point in time from multiple individuals can only be used to investigate between-person differences, so to compare the individuals with the others in that group (Curran & Bauer, 2011). This is often done to analyze trait levels of personality. Yet, when data at the state level is collected, analysis at the within-person level can also become possible, if multiple measurements are carried out over more than one point in time (Curran & Bauer, 2011).

This study uses data collected through such a methodology, namely with the experience sampling method (ESM) (Csikszentmihalyi & Larson, 2014). The objective of ESM is to obtain self-reports that reflect people's everyday life. Participants are signaled according to a random schedule, for example randomly within every two hour time block between 8.00 a.m. and 10.00 p.m. When participants receive the signal, they are cued to fill in a (short) self-report questionnaire. ESM data comes with a number of advantages over survey data (Schimmack & Diener, 2003). For example, survey data often covers extensive periods of time and answers are thus based on memory which can be biased (Schimmack & Diener, 2003). Also, it measures the investigated constructs in-the-moment, as they occur, which makes comparisons both at the state level and the trait level possible (Kahneman, 1999). As Kahneman (1999) described, this helps to understand the effect of circumstances in the immediate environment on happiness, but also to investigate trait happiness as an aggregate of the repeated responses over time.

Thus, it is possible to investigate how the state and trait levels of extraversion and happiness relate. For example, someone high in trait extraversion might experience low state happiness at one point in time. Following the dynamic mediation model of state and trait personality, they would probably be seeking out sociable activities, such as calling a friend, to increase their state happiness (Wilt et al., 2012; Howell et al., 2017).

Current Study and Research Questions

Despite the fact that the research into happiness and extraversion has long roots, there is still much that needs more specific investigation. For example, a recent review by Sun, Kaufman and Smilie (2018) emphasized the importance and utility of investigating specific parts of well-being. This study follows their lead and focuses specifically on happiness.

As the present study uses data collected through ESM, analyses at both the within- and between-person level are possible. An exploratory research question is posed aiming at within-person differences in state extraversion and state happiness. Subsequently, those scores are then compared between the participants and across time, to give an overview of the sample and the development of the constructs over the measured week. Next, a set of hypotheses is introduced that zooms in on the connections between the different levels of extraversion and happiness. As previous literature predicts a connection between extraversion and happiness, all four hypotheses are formulated towards a significant relationship. First, the corresponding null-hypothesis is presented.

- Research Question: How do state extraversion and state happiness develop over time and across participants?
- $H_0$1: There is no significant relationship between trait extraversion and average state happiness. H1: Trait extraversion has a significant relationship with average state happiness.
- $H_0$2: There is no significant relationship between trait happiness and average state extraversion. H2: Trait happiness has a significant relationship with average state extraversion.
- $H_0$3: There is no significant relationship between average state extraversion and average state happiness. H3: Average state extraversion has a significant relationship with average state happiness.
- $H_0$4: There is no significant relationship between state extraversion and state happiness. H4: State extraversion has a significant relationship with state happiness.

Method

Design

This study used data collected by bachelor students at the University of Twente, the author did not partake in the data collection process. The experience sampling method (ESM) was used to make analyses at the state level and also of within-person differences possible. In line with the gold standard of the ESM, signal-contingent sampling strategy was used, so on the seven days of data collection, measurements were administered four times per day, each time randomly triggered within a one-hour time window (Conner & Lehman, 2012; Table 1).

Table 1. Time frames of data collection

Time Window	Actual Time
1	9am to 10am
2	12pm to 1pm
3	4pm to 5pm
4	8pm to 9pm

The online survey was created with Ethica Data, an online tool that allows the design of research studies (Ethica Data Services Inc, 2021). Participants only needed to download the application to their phone and then they could easily receive an invitation to participate in the study. The design of the application made it more accessible for participants to fill in all questionnaires daily and the application also sent notifications when it was time to fill in the next daily questionnaire, which helped to increase participants' attendance within the research. In this study, participants were notified each day on four occasions for a period of seven days. This design was chosen to collect as much data as possible and keep the participant burden relatively low, as ESM is quite intrusive and takes up longer stretches of their time (Van Berkel, Ferreira & Kostakos, 2017). Ethical approval was granted by the University of Twente Ethics Committee of the Behavioural, Management, and Social Sciences (BMS) faculties.

Participants

The data discussed in this study was collected from a sample of 37 participants. In the beginning, sampling was aimed at university students as the designated target group, yet a

broader range of young adult participants were admitted also, to increase the statistical power of the data. The sample consisted of female (N = 27) and male (N = 10) participants with an age ranging from 18 to 52 (M_{age} = 22.7; SD = 6.6). Most participants were German (N = 36), only one participant was from a non-German country. As previously alluded to, the largest group of participants were students (who are not working next to their studies) (N = 21) some participants were working and studying (N = 12), while four participants assigned themselves in the "Other" category of occupation. Inclusion criteria contained a minimum age of 18 years and sufficient comprehension of the English language. Also, participants were required to own a smartphone in order to access the application the study used for data collection. Participants not fulfilling these criteria or those with a response rate below 40% were excluded from the dataset (Conner & Lehman, 2012).

Procedure

The participants of the study have been recruited through the Test Subject Pool BMS of the University of Twente utilizing a convenience sampling strategy. Also, social media such as the application WhatsApp, were used to distribute a link leading to the study. Students at the University of Twente who participated in the study received a credit on the Test Subject Pool BMS as compensation, while no compensation was given to participants outside of the University of Twente. Before the actual beginning of the study, a one-week pilot test was conducted, in order to probe for possible disturbances. No issues were found.

In total, the study was carried out over eight days as participants used the first day to enroll and receive and process all necessary information in order to participate. Therefore, participants were supplied with a consent form, contact details of the researchers and more general information about the nature of the study and data collection. Furthermore, on the first day demographics such as age, gender, nationality, and occupation were requested, followed by a trait assessment of both happiness and extraversion.

Measures

Trait Questionnaires

Happiness

To assess trait happiness levels, the 'Happiness' subscale of the Abridged Five Factor Circumplex Model (AB5C) was used (Hofstee et al.,1992). This scale includes ten items answered on a five-point Likert-scale. Answers range from one (very inaccurate) to five (very accurate) and five items are reverse-coded. Items include "I feel seldom blue" or "I look at

the bright side of life". Regarding psychometric properties, the scale shows good internal consistency (α = .84) and acceptable structural validity (Bäckström et al., 2009). Similar properties were found for this specific sample (α = .83).

Extraversion

The Big Five Aspect Scales' subscale of extraversion was used for the assessment of trait levels of the construct (DeYoung, Quilty & Peterson, 2007). The extraversion-subscale uses ten questions per facet of extraversion, with a total of 20 questions. Nine of the items are reverse-coded and all are answered on a five-point Likert-scale with answers ranging from one (very inaccurate) to five (very accurate). Concerning the psychometric properties of the measure, the subscale displays good internal consistency for different samples of university students (α = .86 - .88). The same is true for this specific sample (α = .84). Furthermore, factor loadings for normally scored items range from .46 to .71 (Mean = .61) and for reverse-coded items between -.62 and -.44 (Mean = -.56).

State Questionnaire

Since no standardized questionnaires exist for the assessment of state level extraversion and happiness through ESM, the researchers designed three items for that purpose. Two items relate to extraversion and the third assesses happiness. The three items include "I feel extraverted/sociable at the moment", "I feel a need to withdraw right now" and "I feel happy at the moment".

Each item is answered on a five-point Likert scale, with answers ranging from one (very inaccurate) to five (very accurate). As these items were self-made, there have been no prior investigations concerning the psychometric properties. Split-half reliability was used to determine internal consistency within the sample and both the question on happiness (r = .94, p < .001) and the questions on extraversion (r = .81, p < .001) show strong internal consistency.

Data Analysis

The data was exported from Ethica Data and imported into SPSS. SPSS 26 was used for all statistical analyses with a significance level of 0.05 (p < .001), while Excel and Google Tables were used to graphically illustrate the data. Before the beginning of analysis, the raw experience sampling data was changed into long format. To calculate the internal consistency of the newly created state measures of extraversion and happiness, split-half reliability was

used. Thus, the long format data was split in half, then the means of the first half were compared with those of the second half (Barrett & Barrett, 2001). Then, a new SPSS file was created to later accommodate average state and trait values. To get an overview of the sample, the participants' demographic data was analyzed and means, standard deviation, minimum and maximum values were calculated for each trait and state construct.

A linear mixed model (LMM) with a nested autoregressive covariance structure was used to compute average state variables by calculating estimated marginal means for both the time points and participants. Those were needed for further analysis. The resulting mean scores were used to give an overview of the average development of state extraversion and happiness over time and across participants (Curran & Bauer, 2011). Then, another LMM was conducted, and state extraversion was included as a covariate to predict the level of state happiness based on participant's state extraversion.

Finally, Pearson correlations were used to investigate the correlation between trait extraversion and average levels of happiness, as well as average state extraversion, average state happiness and trait happiness. The subsequent interpretation of the Pearson correlation coefficients followed the guidelines by Cohen (1988).

Results

Descriptive Statistics

The overall means of the average states are 3.26 (SD = 1.18) for extraversion and 3.20 (SD = 0.63) for happiness. Average state extraversion (p = .116) shows no significant relationship with the time point of measurement. Yet, the average level of state happiness (p = .037) does show a significant association with the time points of measurement.

Regarding participants, those with the highest mean scores for each construct are #10 for average state extraversion (4.78) and #32 for average state happiness (4.58) (Figure 1; Figure 2). Participant #17 has the overall lowest mean score for average state extraversion (1.35), while participant #29 has the lowest mean of average state happiness (2.81) (Figure 1; Figure 2).

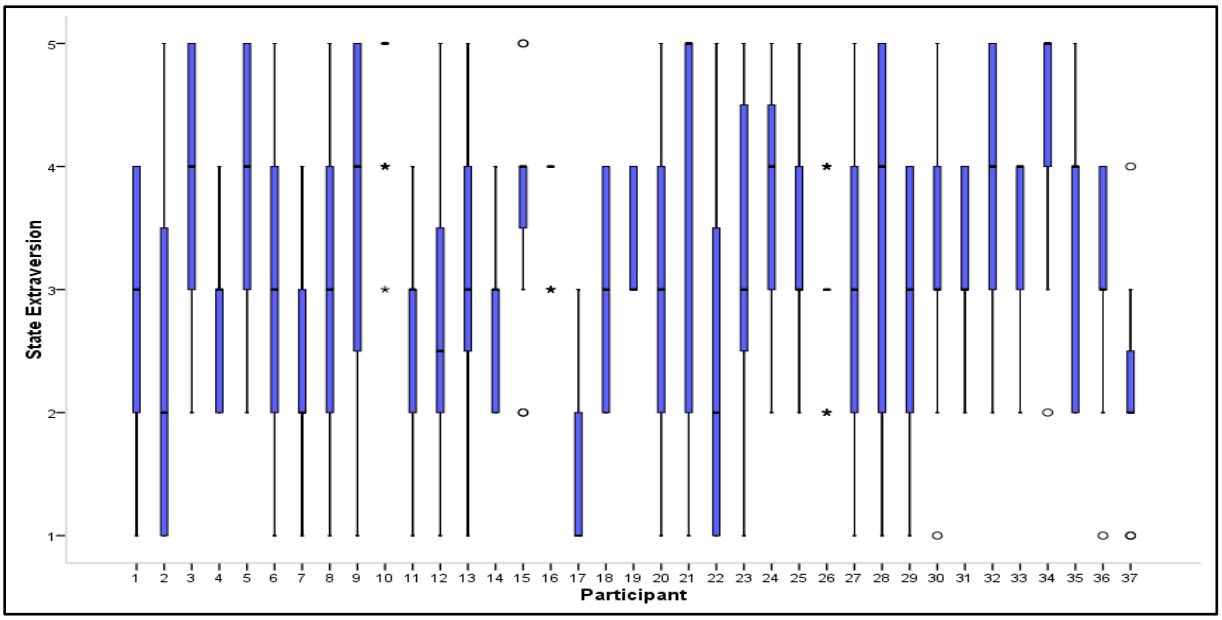

Figure 1. Distribution of state extraversion per participant

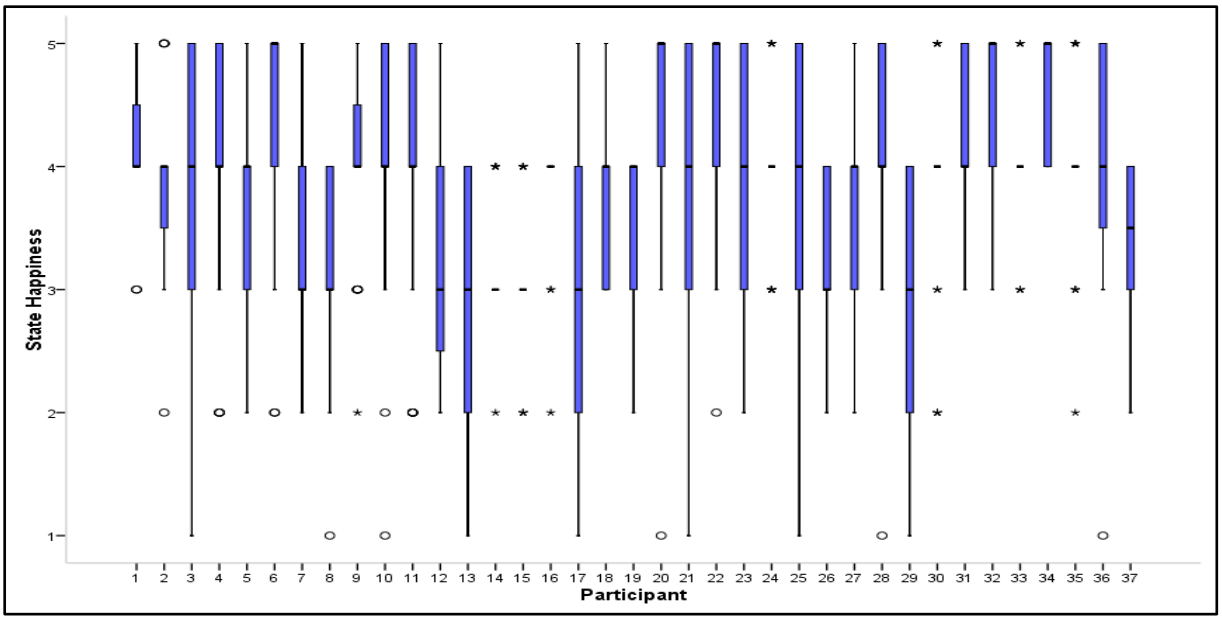

Figure 2. Distribution of state happiness per participant

Associations Between Trait Extraversion And Average State Happiness

As the literature predicts a connection between extraversion and happiness, Pearson correlations were conducted to investigate the association between trait extraversion and average state happiness in this sample. Surprisingly, the output showed a very low Pearson coefficient (r = 0.12) with no signs of a significant association (p = .470). Figure 3 visually illustrates these results. Thus, the null-hypothesis '$H_0$1: There is no significant relationship between trait extraversion and average state happiness.' has to be accepted.

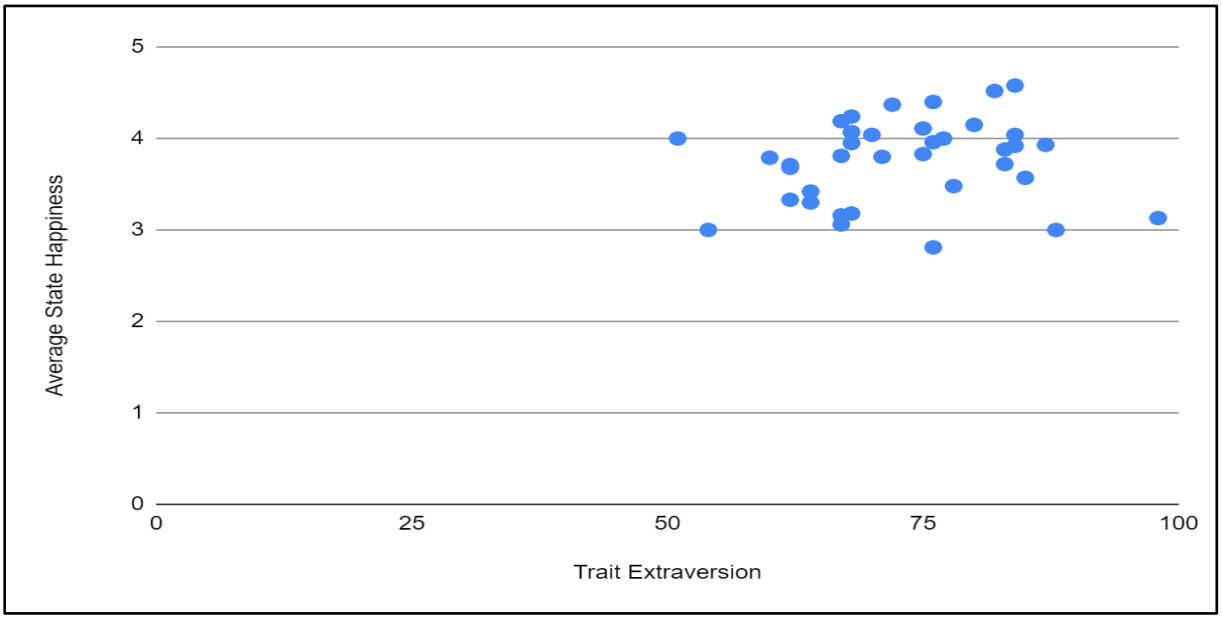

Figure 3. Average state happiness per trait extraversion

Associations Between Trait Happiness And Average State Extraversion

To further investigate the trait and state connections, Pearson correlations between trait happiness and average state extraversion were conducted. The coefficient for this relationship is non-significant (r = .440, p = .004). Thus, the third null-hypothesis '$H_0$3: There is no significant relationship between trait happiness and- average state extraversion' has to be accepted. Figure 4 visually illustrates this result.

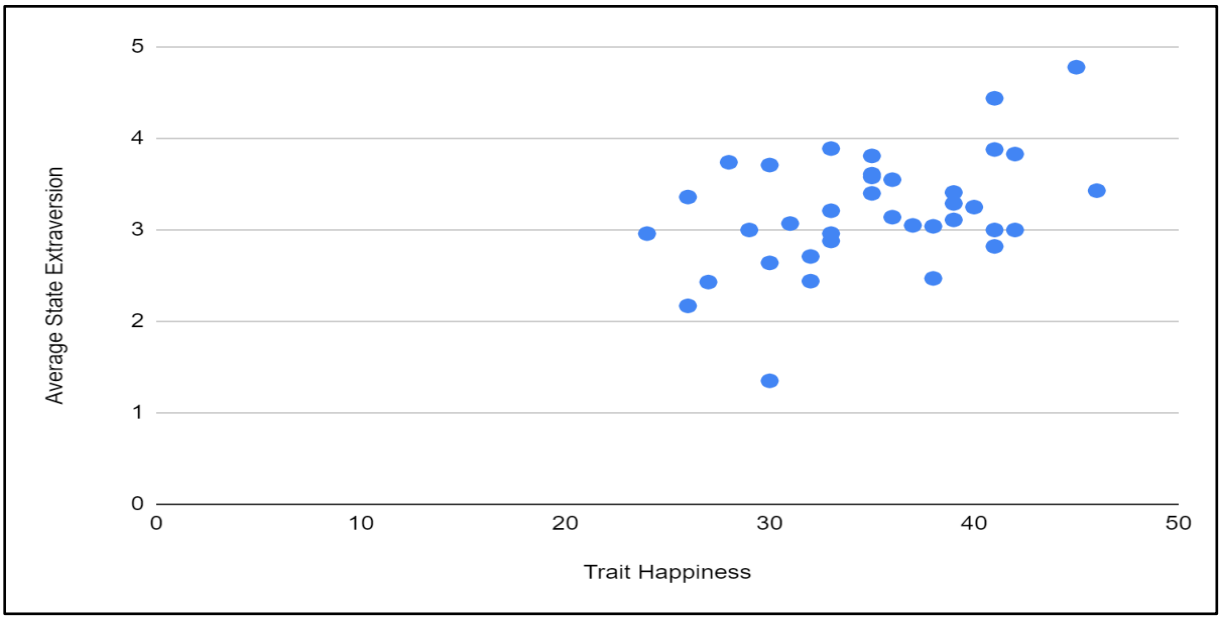

Figure 4. Average state extraversion per trait happiness

Associations Between Average State Extraversion And Average State Happiness

The Pearson coefficient of average state extraversion and average state happiness show a significant association per participant with a strong positive correlation ($r = .586$, $p < .001$). Therefore, the second null-hypothesis '$H_0$3: There is no significant relationship between average state extraversion and average state happiness.' has to be rejected and the second hypothesis 'H3: Average state extraversion has a significant relationship with average state happiness.' accepted. Figure 5 visually illustrates this correlation. This means that those participants who on average felt more extraverted over the course of the week, also reported feeling happier.

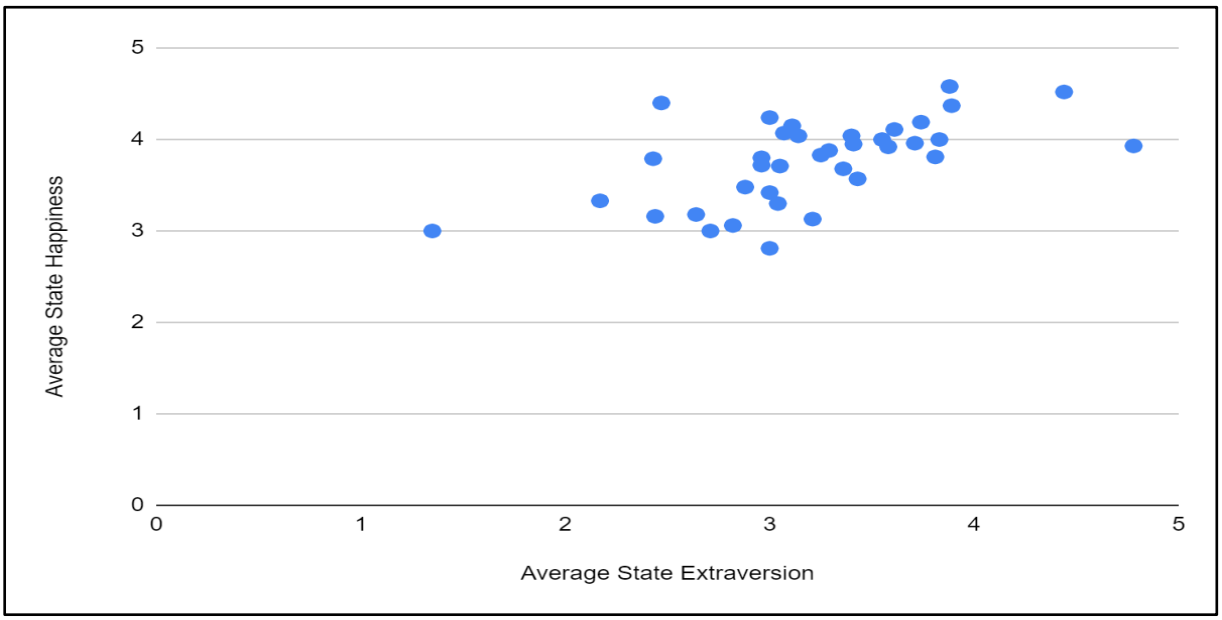

Figure 5. Average state happiness per average state extraversion

Association Between State Extraversion and State Happiness

Linear mixed models over all time points were used to analyze state happiness per participant with state extraversion as the covariate and revealed a significant association, $\beta = .44$, SE = .21, $p < .001$, 95% CI [.40, .48]. Thus, the fourth null-hypothesis '$H_0$4: There is no significant relationship between state extraversion and state happiness.' is rejected and 'H4: State extraversion has a significant relationship with state happiness.' accepted. Regarding the confidence interval, it is 95% certain that the beta-coefficient for the population is between .40 and .48.

Discussion

The aim of this study was to investigate the associations between extraversion and happiness in the dynamic context of daily life. First, instead of considering only trait levels like has been done previously many times before, the connection between trait extraversion and the average state of happiness was investigated. This way, Hypothesis 1 builds on the knowledge of the already existing research body by including the trait level, yet instead of focusing on the trait-trait connection, shifts focus to the in-the-moment state measurement. To make comparisons possible, the average of state happiness is chosen as the second construct.

Contrary to what was found repeatedly before, in this sample there was no significant connection between the two constructs. Thus, Hypothesis 1 has to be rejected and the null-hypothesis has to be accepted. This means that overall, those participants with a higher score in trait extraversion did not score significantly higher in their average state happiness. Therefore, those who described themselves as extraverts at the beginning of the study did not report being happy more frequently, which is what the literature would have suggested.

To also investigate the parallel trait-state relationship, the next hypothesis concerned the relationship between trait happiness and average state extraversion, so how describing oneself as an overall happy personality predicts average feelings of extraversion. Furthermore, the analysis between these two constructs was included to make an analysis along the framework of the 'Dynamic Mediation Model of Personality and Affective States' possible (Wilt et al., 2012). As with the previous trait-state relationship, no significant relationship between the two constructs was found. Therefore, Hypothesis 2 has to be rejected and the null-hypothesis has to be accepted. This indicates that, in this sample, there were no significant differences between the average extraversion scores of those who in the beginning of the study described themselves as overall happy and those who scored less on that scale.

Next, focus was shifted to the connections between different levels of state scores. In this way, new findings can be added to the research body since state level analysis of extraversion and happiness is still under-represented in the literature. First, to get an overview of the general levels of extraversion and happiness over the course of the measured week, the association between the average states was investigated. A significant and strong relationship between the two constructs was found and thus Hypothesis 3 can be accepted. This means that those participants who on average reported feeling more extraverted during the measured week also reported feeling happier on average.

The final hypothesis incorporated the in-the-moment measurements of state extraversion and state happiness. In this manner new findings can be added to the existing literature on the relationship between extraversion and happiness, given that until now those mostly concerned trait-trait relationships. It was found that there is a strong and significant relationship between the two constructs. Thus, Hypothesis 4 can be accepted. This indicates that the degree to which a person feels extraverted in a given situation predicts the level of happiness they experience. The higher the degree of extraversion, the happier people are.

Trait Extraversion and State Happiness

As previous studies focused their analyses mostly on trait-trait connections, the relationships between states and traits were investigated first (e.g. Francis et al., 1998; Hills & Argyle, 2001). In this way, new knowledge is built upon already existing research. Yet, the current study found no significant connection between trait extraversion and the average level of happiness of participants over the course of the measured week.

This contradicts the claim that extraversion is positively associated with happiness (Furnham & Brewin, 1990; Francis et al., 1998). In previous research, extraverts were described as talkative, gregarious, and high in positive emotions (Wilmot et al., 2019). They tend to express these positive emotions and prefer stimulating activities and have a natural proclivity towards social engagement (Watson et al., 1992; Soto & John, 2017 retrieved from Tan et al., 2018). Yet, in the present sample, trait extraversion did not significantly predict average states of happiness. There are three apparent explanations for this.

Firstly, this finding supports the notion by Fleeson (2004) about the high variability of momentary behaviours, as traits are better used to predict behavioural trends over longer stretches of time and to a lesser extent to explain in-the-moment variations or their aggregates. So, perhaps had the data collection occurred over a longer period of time, the impact of trait extraversion would be significant.

Moreover, as the data was collected during the covid-19 pandemic with university students stuck in their dorm room, extraverts were at risk of loneliness (Bu, Steptoe & Fancourt, 2020). Therefore, they lacked their usual fuel for happiness: social engagement. Previous research has shown that social engagement contributes to wellbeing and especially extraverts tend to gravitate towards social activities to increase their happiness (Watson et al., 1992; Hills & Argyle, 2001). Also, the covid-19 pandemic has led to an overall increase in depressive symptoms of people worldwide which holds especially true for university students, the population the sample was drawn from (Dwidienawati et al., 2021; Wijngaards,

de Zilwa & Burger, 2020). Additionally, studies have shown that state happiness (and thus its average) is highly dependent on context (Schwarz, 1987). If a minor life event such as the outcome of a football match can impact reports of life satisfaction, then the impact of month-long isolation due to a global pandemic cannot be understated (Schwarz et al., 1987).

Another possible reason for this finding is that, as stated before by McNiel and Fleeson (2006), there simply might not be that much of an impact of trait extraversion on state happiness. No significant relationship was reported in their study either, and perhaps traits and states should not be analyzed like this (Fleeson, 2004). Some studies even concluded that personality states and traits might inherently be the same thing, the traits only being the accumulation of state values over a long period of time (Rauthmann, Horstmann & Sherman, 2019). In a different study, Zelenski, Santoro and Whelan (2012) prompted participants to act in an extraverted manner, despite their trait. In either case, so both for introverts and extraverts, acting in an extraverted manner was associated with positive affect. So, perhaps traits only indicate the frequency of a certain behaviour, yet there is no impact on the actual behaviour itself.

(Average) State Extraversion and (Average) State Happiness

After considering the association of the trait level of extraversion with general levels of happiness, the averages states and their connections come into focus. Across participants a significant relationship with strong correlations was found. Furthermore, in-the-moment measurements of the state expressions are also significantly related. This implies that people who on average feel more extraverted report higher average levels of happiness. Moreover, when zooming in on the in-the-moment measures, respondents who report higher levels of extraversion in a given situation also tend to report higher levels of happiness in that same moment.

These findings support what has already been found in previous research. Typical extraverts were described as usually engaging with others and it has been shown that social engagement increases happiness (Watson et al., 1992; Soto & John, 2017 retrieved from Tan et al., 2018). The present findings demonstrate that this holds true for the dynamic context of daily life as well. An earlier study on state extraversion and positive affect revealed similarly strong and significant connections (McNiel & Fleeson, 2006). Thus, it adds to the increasing body of research that finds state extraversion to be a strong predictor of momentary happiness.

Dynamic Mediation Model of Personality and Affective States

As it appears to be one of the most promising models of personality and affective states, the findings of the present study are incorporated into the theoretical framework of the dynamic mediation model (Wilt et al., 2012). According to this model, personality traits impact happiness in three dynamic ways. First, personality traits are associated with an increased propensity towards certain trait-consistent behaviours. Those behaviours, in the case of extraversion, lead to an increase in positive emotions and the accumulation of these emotions leads to an indirect increase in one's overall happiness (Wilt et al., 2012).

In the present study, only part of the model can be confirmed. Trait extraversion is not associated with an increased propensity towards trait-consistent behaviours. Yet, those who carried out more extraverted behaviour over the course of a week experienced more happiness than those who did not, independent of their trait level. Implications of average state extraversion for participant's overall happiness turned out to be non-significant as well.

Thus, only one out of three parts of the dynamic mediation model of personality and affective states can be confirmed for this specific sample. A relatively short data collection time frame, as well as generally decreased levels of happiness due to the covid-19 pandemic might give indications of why that is, yet perhaps the model requires further revision. Other studies already point at the importance of considering personality states over traits, but more research in that direction is required (Fleeson, 2001). As the data indicates here, the connections between personality and affect appear more in-the-moment and less dependent on one's trait.

Further Findings

Because many studies pointed at the impact of the covid-19 pandemic on global happiness levels, a comparison between present happiness levels and levels of prior studies is vital. The research points at a general increase in depressive symptoms (and psychopathology in general) due to the onset of the covid-19 pandemic, yet others show that this increase is not the same for everyone (Dwidienawati et al., 2021; Pan et al., 2021; Wijngaards, de Zilwa & Burger, 2020). After the onset of the pandemic, Pan and his colleagues (2021) found an increase in psychopathological symptoms in those who have no diagnosed mental health disorder, yet those who did have a severe disorder showed no significant differences after the onset of the pandemic, for some of them the symptoms even decreased. Given the complexity of this issue, the happiness scores of this study are compared to previous studies.

While the present sample yielded a mean happiness score of 3.20 out of 5 with a standard deviation of .63, older studies often presented higher happiness levels. To illustrate this, three different studies that cover a time frame from 2005 to 2018 are examined. All three studies have found higher average happiness levels. While the caveat is that none of the studies used the same methodology as the present study, comparisons are still possible to give an indication of the development, given the robustness of all procedural elements.

Beginning with the earliest of the three, Chan, Miller and Tcha (2005) found a mean happiness score of 3.73 out of 5 (SD = .85) in their sample. A later study found even higher levels of 4.94 out of 7 (SD = 1.04) (San Martín, Perles & Canto, 2010). The latest study identified average happiness levels of 3.38 out of 4 (SD = .25) (Ziapour et al., 2018). While it again has to be noted that all three presented studies used a methodological approach that is somewhat different from the present study, the results still give an indication that happiness levels in this study are comparably low. Over a timespan of thirteen years all three studies yielded higher levels of happiness than the present sample, which is in line with the findings of Greyling, Rossouw and Adhikari (2020), who pointed towards the lowered happiness levels of university students due to the pandemic. While the direct impact of the pandemic on the student's happiness is not clear cut, a lowered happiness mean score indicates correlation.

Strengths and Limitations

Given the context of daily life, the present study adds a novel approach to the research of personality and happiness, also including the method of data collection. Previous study focused on the connection between personality traits and affective expression over longer periods of time, while ESM allows to measure their relationship in-the-moment and in the context of daily life (Kahneman, 1999). In this way, analysis across levels becomes possible, to see how one's disposition (trait) impacts one's actual day to day behaviour (state) and how the state levels are related.

Still, the present study also includes some limitations. The sample included mainly university students, only four of the participants were no students at the time of data collection. This poses obvious issues with regards to the generalizability of the data, but especially in the case of happiness research this might be the case. Given students' cognitive abilities, their appraisal of their overall happiness might be different from other populations (Chopik &Lucas, 2019). Also, studies have shown that university students are one of the groups that suffered most from the pandemic's global impact on happiness (Dwidienawati et al., 2021; Wijngaards, de Zilwa & Burger, 2020).

Another limitation can be found in the state questionnaire that was utilized for data collection. Given the absence of a robust state measure for extraversion, the bachelor students who conducted the data collection took it upon themselves to create a novel instrument. While it did have strong internal reliability ratings, there was no significant connection between the trait and state level of either construct. While many possible reasons for this were discussed previously, it might also be the case that the questions or their application require further revision and that ESM measures have to be created with special caution. A study that investigated the validity and reliability of ESM questionnaires came to a similar conclusion, as in some samples the same measure proved to be reliable, in another not (Csikszentmihalyi & Larson, 2014). This shows that ESM measures, especially novel creations, require rigorous and repeated testing of psychometric properties. Meanwhile, Barrett and Barrett (2001) also utilized their own state questionnaires and found good reliability and validity coefficients. The ambiguous nature of ESM measures makes it difficult to validate the results of the present study. Still, in the absence of proven instruments the creation of an own questionnaire is the only way to approach data collection in the context of daily life.

Implications for Future Research

Based on the discussion of the present findings and their limitations, three directions for future studies emerge. Firstly, a study such as this one should be carried out over a longer period of time, this way it becomes clearer how the states and traits of extraversion interact with each other and with happiness. Yet, this direction poses two problems. Firstly, it is difficult to determine exactly how long the process of data collection should be, given that most personality type questionnaires do not focus on a specific time frame, such as the last 3 months (Caprara et al., 1993; Wilks, 2009). Moreover, carrying out an ESM study over a longer period of time goes beyond the standard of ESM studies and should only be done very carefully (Conner & Lehman, 2012). Still, when carried out well, this could give innovative insights into how personality states and traits are connected.

Moreover, a different sample should be considered. This sample included mainly university students and perhaps a different sample yields contrasting results. Chopik and Lucas (2019) argued that given the cognitive component of happiness, participants with lower cognitive abilities might be more responsive to contextual cues (such as the covid-19 pandemic) or use mental heuristics which alter their evaluations of happiness and their

satisfaction with life. Given the cognitive capacity of university students, other populations might react differently to the covid-19 pandemic and ensuing measures.

Finally, the impact of the covid-19 pandemic on the study cannot be understated. Compared to before the onset of the pandemic many students worldwide reported lower levels of happiness (Dwidienawati et al., 2021; Wijngaards, de Zilwa & Burger, 2020). Also, due to the governmental responses to the pandemic, many students were at an increased risk of loneliness, which poses special problems for socializing, which is a core aspect of extraverted behaviour (Bu, Steptoe & Fancourt, 2020; Hills & Argyle, 2001; Watson et al., 1992). Under such circumstances, a study on the impact of extraversion on happiness is faced with special dilemmas and the data should be carefully compared to former or future studies.

Conclusions

Despite the presence of a global pandemic, this study provides further evidence for the consensus that extraversion and happiness are strongly linked together. While previous studies focused more on the trait associations, the present study shifted the focus mainly on the associations at the in-the-moment state level. Here, strong and significant associations were found, so feeling more extraverted in a given moment is associated with higher levels of happiness. More importantly, this is true while the trait level of extraversion has no significant association with average happiness levels. So, being an introvert or being an extravert makes no significant difference in this association. This means that acting like an extravert, whether you are one or not, predicts higher levels of happiness. Future research should focus more on the specific behaviours and components of extraversion that lead to an increase in happiness.

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