

**A Comprehensive Psychometric Evaluation of the Future Self-Continuity Questionnaire**

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### Abstract

Future self-continuity is the relationship between an individual's perception of their present and future selves and is attracting intense interest from researchers in psychology and health. This study aimed to psychometrically evaluate the Future Self-Continuity Questionnaire (FSCQ), a tool designed to measure an individual's future self-continuity, in New Zealand's unique sociocultural context. In Phase 1 we tested the reliability (internal consistency) of the 10 item FSCQ and its three subscales and attempted to replicate the three-factor structure reported previously. In Phase 2 we examined the FSCQ's correlations with established measures like the Future Self-Continuity Scale (FSCS), Consideration of Future Consequences (CFC-14) Scale, Multidimensional Temporal Self-Continuity Scale (MTSCS), and Beck Hopelessness Scale (BHS). Results from the first phase confirmed the FSCQ's reliability and construct validity, with strong internal consistency ( $\alpha$  ranged from .77 to .87) and a good factorial structure (GFI=.97, RMSEA=.04). In the second phase, the FSCQ demonstrated positive correlations with the FSCS, CFC-14, and MTSCS, and negative correlations with the BHS. These findings suggest that the FSCQ reliably measures FSC, has a robust replicable three-factor structure and is consistent with other relevant psychological constructs. This study demonstrates the applicability of the FSCQ outside the United States for the first time.

## 22 **A Comprehensive Psychometric Evaluation of the Future Self-Continuity Questionnaire**

23 Future Self-Continuity (FSC) is an emerging concept in psychological research,  
24 representing the degree to which individuals perceive a connection and continuity between  
25 their present and future selves (Ersner-Hershfield, Garton, et al., 2009; Ersner-Hershfield,  
26 Wimmer, et al., 2009). It includes how people project their present identity into the future,  
27 and although this identity may potentially change over time, it still entails a thread of  
28 sameness (Parfit, 1971).

29 Hershfield (2011) developed a model of FSC which proposed three domains:  
30 *similarity, vividness and positive affect (positivity)*, which collectively determine FSC. The  
31 degree of concordance people perceive between their current self and their future self is  
32 referred to as “similarity”. The higher the level of similarity, the stronger their FSC is  
33 (Ersner-Hershfield, Garton, et al., 2009; Parfit, 1971). If, for example, individuals feel less  
34 similarity, they may perceive their future identity as essentially a different person, and they  
35 are less likely to consider their future self in the present moment. Hence, they are less likely  
36 to avoid unhealthy foods, quit smoking, or exercise regularly (Rutchick et al., 2018; Zhao et  
37 al., 2022). The degree of clarity that a person perceives when imagining their future self is  
38 referred to as “vividness”. The clearer the mental picture that emerges when people imagine  
39 their future self, the easier it is for them to empathize with their future self (Blouin-Hudon &  
40 Pychyl, 2017; Klineberg, 1968; Moss et al., 2018). Furthermore, research by McElwee and  
41 Haugh (2010) indicates that individuals perceive their future as more immediate when they  
42 have a vivid and concrete perception of it, suggesting that a clearer envisioning of one’s  
43 future self can psychologically shorten the perceived distance to that future. The extent to  
44 which someone positively imagines their future self is referred to as “positivity”. When a  
45 person visualizes a more optimistic or positive image of their future self, it proves easier for

46 them to then connect their current self with the future self (Hershfield & Galinsky, 2011;  
47 Zhang & Aggarwal, 2015).

48 The significance of FSC lies in its association with various psychological outcomes, such  
49 as decision-making, academic achievement, social behavior and health behaviors (Adelman  
50 et al., 2017; Bartels & Urminsky, 2011; Rutchick et al., 2018; van Gelder et al., 2013; Van  
51 Gelder et al., 2015).

52 Some of the research conducted to date has been in the area of intertemporal decision-  
53 making and is mainly reflected in studies involving “temporal discounting”. People who  
54 value present or short-term profits and losses more than future gains and losses are  
55 considered to be engaging in temporal discounting (Ersner-Hershfield, Wimmer, et al., 2009).  
56 Older adults typically display less temporal discounting, or the tendency to discount longer-  
57 term future outcomes in favor of more immediate ones (Löckenhoff, 2011). Bartels and  
58 Urminsky (2011) found that when an individual’s future self was more similar and more  
59 connected to their current self, they were better able to modify their current behavior to  
60 improve the probability of positive outcomes in the future, thus showing less temporal  
61 discounting.

62 Future self-continuity also has an impact on college students’ academic achievement.  
63 Adelman et al. (2017) found that students with high FSC showed higher self-control and  
64 thought more about how their present actions might affect their future self, leading to higher  
65 academic achievement. Likewise, FSC can affect social behavior; for example, van Gelder et  
66 al. (2013) found that participants with low FSC were more likely to engage in delinquency.  
67 Other researchers who have manipulated participants’ FSC found that those with a strong  
68 sense of connectedness between their current and future selves tend to engage in altruistic  
69 behaviors, specifically manifesting as increased donations to charitable organizations (Zhang  
70 & Aggarwal, 2015).

71           Recent studies have demonstrated the influence of FSC on individuals' health-related  
72 behaviors. For example, individuals who are more conscious of the short-term effects of their  
73 present actions are more likely to smoke and consume unhealthy meals than those who are  
74 more focused on their long-term future selves (Pozolotina & Olsen, 2019). Zhao et al. (2022)  
75 studied the smoking behavior of Austrians and demonstrated that an individual's FSC,  
76 especially in terms of perceived similarity to their future self, was a significant predictor of  
77 smoking behavior. Rutchick et al. (2018) showed that FSC was positively associated with  
78 individuals' self-reported health.

79           FSC has also been shown to have a significant impact on mental health outcomes,  
80 particularly in relation to mood disorders such as depression and anxiety, as well as stress and  
81 suicidality. Research has highlighted that higher levels of FSC are associated with reduced  
82 depressive symptoms and a lower risk of anxiety and stress (Sokol & Serper, 2020; Levin et  
83 al., 2023). Conversely, individuals with lower FSC are more likely to experience  
84 psychological distress, which can manifest as increased depression, anxiety, and even  
85 suicidal ideation (Hershfield, 2011; Sokol & Serper, 2020). Other studies, such as those by  
86 Xue et al. (2023), have further corroborated these findings by demonstrating that FSC plays a  
87 crucial role in moderating the impact of negative life events on mental health, thus  
88 underscoring its importance in psychological resilience.

89           A cross-cultural study has shown that people's cultural background shapes how they  
90 see themselves across time (Kirmayer, 2007) and a study using a "culturally contextualized  
91 model of self-continuity" involving 55 cultures in 33 countries found that people's  
92 understanding of their own identity can influence how they view their past, present and future  
93 selves (Becker et al., 2018). In some cultures, such as in East Asia, people feel their  
94 perception of identity changes over time, viewing personal attributes as flexible and  
95 influenced by circumstances (Becker et al., 2018). In contrast, in other cultures, such as North

96 America, people perceive their identity to be relatively consistent, holding a belief in a stable  
97 and enduring self (Becker et al., 2018). Individuals who perceive their identity to remain  
98 constant tend to have higher similarity between their future and present selves, and thus they  
99 have higher levels of continuity of their future selves (Becker et al., 2018)

100 The literature to date on FSC emphasizes the importance of considering FSC in  
101 theoretical and applied psychology, and may pave the way for interventions aimed at  
102 enhancing FSC to promote positive life outcomes.

### 103 **Future Self-Continuity Questionnaire (FSCQ) and Its Application in Various** 104 **Studies**

105 The Future Self Continuity Questionnaire (FSCQ) represents an important advance in  
106 measuring individuals' connections to their future selves (Sokol & Serper, 2020). This  
107 questionnaire was developed based on Hershfield's (2011) theory of FSC and the FSCQ has  
108 already been used in a variety of studies, revealing its multifaceted applications in  
109 psychological research. Zhang et al. (2022) conducted an evaluation and revision of the  
110 questionnaire within a Chinese context, demonstrating its strong reliability. Subsequently,  
111 researchers in China have conducted a series of studies using the FSCQ, such as measuring  
112 FSC levels of students in rural areas, to demonstrate the impact of mental imagery practice on  
113 increasing FSC and health-promoting behaviors (Gao et al., 2023). Additionally, Wang et al.  
114 (2022) used a revised version of the FSCQ to measure individuals' FSC and concluded that  
115 people's FSC was a positive predictor of their use of internet wealth management systems.

116 Researchers in the United States have also applied the FSCQ in different studies.  
117 Sokol et al. (2022) measured over 300 adult veterans' FSC and found that higher levels of  
118 FSC were a protective factor for suicide in veterans with traumatic brain injury. Levin et al.  
119 (2023) demonstrated that in the first 10 years following retirement, veterans' levels of FSC

120 mitigated the impact of unemployment on harmful mental health outcomes. In addition,  
121 scholars have found that individuals experiencing body dissatisfaction and negative  
122 consequences show more healthy behaviors when they have high FSC levels (Kwan et al.,  
123 2024).

## 124 **Objectives of the Current Study**

125 Our research focused on the evaluation and validation of the Future Self-Continuity  
126 Questionnaire (FSCQ) among adults in New Zealand. While the FSCQ has been applied in a  
127 number of cultural and demographic contexts, it appears there has been no other independent  
128 psychometric evaluation of the measure with the exception of the Chinese adaptation. The  
129 present study therefore sought to fill an important gap in the literature.

## 130 **Phase 1: Reliability and Factor Structure of the FSCQ**

### 131 **Method**

#### 132 *Participants and Procedure*

133 We utilized Qualtrics software  
134 ([https://aut.au1.qualtrics.com/jfe/form/SV\\_55wYmhQhwzYGMwS](https://aut.au1.qualtrics.com/jfe/form/SV_55wYmhQhwzYGMwS)) for online questionnaire  
135 response collection. Pilot testing was used to correct, refine and improve the survey. We  
136 distributed advertisements which included a link to the survey to various community  
137 noticeboards and also posted the advertisement on social media platforms. All research  
138 procedures received approval from Auckland University of Technology's ethics committee  
139 (reference no. 22/262).

140 Participants were eligible if they were aged 18 to 75 years old and lived in New  
141 Zealand. After reviewing the participant information sheet, all participants were directed to a

142 separate consent page. By proceeding with the questionnaire, participants implicitly affirmed  
143 their consent to participate in the study. Participants who completed the survey went into a  
144 draw to win one of five \$100 shopping vouchers.

145 A total of 351 individuals commenced the survey but 22 responses were excluded as  
146 invalid due to incompleteness. IP address verification confirmed that all participants were  
147 responding from within New Zealand. The final sample comprised 329 individuals: 169  
148 females (51.4%), 142 males (43.2%), and 8 identifying with another gender (2.4%), with 10  
149 participants (3%) not providing a response to the gender question. Ages ranged from 18 to 73  
150 years (mean age = 34.22 years, SD = 13.176). Of the 329 participants, 120 identified as  
151 European (36.5%), 116 as Asian (35.3%), 42 as Māori (12.8%), 29 as Pacific peoples (8.8%),  
152 34 as MELAA (Middle Eastern, Latin American, African) (10.3%), and 10 as Other ethnicity  
153 (3%). 18 participants selected two ethnicities, and 2 participants selected three ethnicities,  
154 which is reflective of New Zealand's status as a multicultural country.

### 155 *Measures*

156 The Future Self-Continuity Questionnaire (FSCQ), developed by Sokol and Serper  
157 (2020) and based on Hershfield's (2011) theory, was used to assess participants' FSC. The  
158 FSCQ comprises 10 items across three dimensions—similarity to the future self (4 items),  
159 vividness to the future self (3 items), and positive affect to the future self (3 items) (Sokol &  
160 Serper, 2020). The questionnaire demonstrates good reliability for its dimensions with  
161 Cronbach's alpha values of .85, .80, and .89, respectively (Sokol & Serper, 2020).

162 Responses are recorded using a 6-point Likert scale – items reflecting similarity to the  
163 future self are rated from 1 (*completely different*) to 6 (*exactly the same*), while items  
164 measuring vividness to the future self and positive affect to the future self are rated from 1  
165 (*not at all*) to 6 (*perfectly*). The overall FSCQ score is derived from the mean of all 10 items  
166 and the means for each subscale are calculated. The similarity score is obtained by averaging

167 items 1-4 (e.g., “How similar are your beliefs now to what they will be like 10 years from  
168 now?”), the vividness score by averaging items 5-7 (e.g., “How vividly can you imagine what  
169 you will look like in 10 years from now?”), and the positive affect score by averaging items  
170 8-10 (e.g., “Do you like what your actions will probably be like 10 years from now?”).

### 171 *Data Analysis*

172 We utilized SPSS v.29.0 to perform various analyses on the FSCQ, including  
173 calculating descriptive statistics, Pearson correlation coefficients, and reliability tests for both  
174 the overall scale and its subscales. In phase 1, we conducted a series of analyses: (1)  
175 descriptive analysis of the 10 FSCQ items to summarize the data, (2) Pearson correlations to  
176 explore the relationships among the three dimensions of the FSCQ, (3) reliability assessments  
177 using Cronbach’s alpha for the overall scale and each subscale, (4) confirmatory factor  
178 analysis (CFA) with AMOS v.29.0 to validate the structure of the scale, and (5) evaluation of  
179 the discriminant validity of the FSCQ’s three dimensions.

## 180 **Results**

### 181 *Descriptive Statistics and Item Frequencies of FSCQ*

182 In this study, missing data were addressed using the Mean Imputation method.  
183 Specifically, for the 329 valid responses, only one participant out of 329 skipped one item,  
184 providing responses to nine out of the ten items. To maintain the integrity of the dataset,  
185 missing responses were replaced with the mean value of the respective item, ensuring that the  
186 overall analysis could proceed without significant loss of data.

187 The normality of the FSCQ items was assessed using skewness and kurtosis, as these  
188 factors influence the validity of most reported analyses. The skewness values for the FSCQ  
189 items ranged from -0.158 to 0.366, indicating that the data distributions are approximately

190 symmetric. The kurtosis values ranged from -0.972 to -0.379, suggesting that the  
191 distributions are slightly flatter than a normal distribution. Given that both skewness and  
192 kurtosis are within acceptable ranges (typically within  $\pm 1.0$ ), the data can be considered to  
193 approximate normality. Therefore, the subsequent statistical analyses in this study assuming  
194 normality are appropriate.

195 Table 1 presents descriptive statistics for the 10 FSCQ items, covering three  
196 dimensions: similarity, vividness, and positivity. Items are presented in descending order of  
197 their mean score. The similarity dimension (FSCQ1-4) shows moderate perceived similarity  
198 between current and future selves, with values ranging from 3.03 to 3.39. Vividness (FSCQ5-  
199 7) reflects a moderate ability to visualize the future, particularly family relationships (mean =  
200 3.36). Positivity (FSCQ8-10) also indicates a moderately positive outlook towards future  
201 aspects, with future personality receiving the highest mean score (3.55).

202 The analysis revealed varying levels of difficulty across the items and variability of  
203 responses for the participants. Typically, a lower mean score indicates a higher perceived  
204 difficulty or reluctance in affirming the statement, suggesting that respondents find it more  
205 challenging to relate to or envision the aspect in question. As evident from Table 1, the most  
206 challenging question for participants was the FSCQ1, that is “How similar are you now to  
207 what you will be like 10 years from now?”, while the easiest was the FSCQ9, which was “Do  
208 you like what your personality will probably be like 10 years from now?”. Furthermore, the  
209 standard deviation provides insight into the variability of responses, with a higher SD  
210 indicating a wider, more varied range of responses. The highest SD for FSCQ1 indicates a  
211 wide range of opinions, making it a relatively complex item. The lowest SD for FSCQ5  
212 indicates a higher level of agreement among respondents regarding their ability to vividly  
213 imagine their future selves, making this item relatively more consistent.

214 Notably, the item frequencies reveal that many respondents perceived differences  
215 between their current and future selves, with less than 50% of respondents agreeing that their  
216 future selves will have some similarity to their current selves (FSCQ1-FSCQ4, response  
217 options 4-6). Items related to future self-liking (FSCQ8-10) demonstrated that the vast  
218 majority of respondents held a generally positive view of their future self, with 81.2%  
219 selecting response options 3-6 for FSCQ8, 74.8% for FSCQ9, and 75.3% for FSCQ10. For  
220 the vividness items, the proportion of respondents being able to vividly imagine themselves  
221 in 10 years' time ranged from 66.6% to 69.7%.

### 222 *Correlations Among the Three Subscales of the FSCQ*

223 Pearson correlation coefficients were computed to assess the relationships among the  
224 three dimensions of the FSCQ: Similarity, Vividness, and Positivity Affect (Table 5).

225 The results revealed a significant positive correlation between the Similarity and  
226 Vividness dimensions ( $r = .307$ , 95% CI [.20, .41],  $p < 0.001$ ), suggesting that people who  
227 perceive a greater similarity with their future selves are more likely to report more vivid  
228 imaginations of their future selves. The Similarity dimension was significantly positively  
229 correlated with the Positivity Affect dimension ( $r = .209$ , 95% CI [.10, .32],  $p < 0.001$ ),  
230 indicating that those participants who see their future selves as similar to their current selves  
231 are more likely to associate more positive emotions with their future selves. Furthermore, the  
232 Vividness dimension exhibited a significant positive correlation with the Positivity Affect  
233 dimension ( $r = .316$ , 95% CI [.20, .42],  $p < 0.001$ ).

### 234 *Reliabilities of Full FSCQ and Subscales*

235 Subsequently, we performed reliability tests on both the overall scale and the  
236 subscales. Overall, reliability was good for the full scale ( $\alpha = .81$ ) and each subscale

237 (similarity,  $\alpha = .82$ ; vividness,  $\alpha = .77$ ; positive affect,  $\alpha = .87$ ). In the evaluation of construct  
238 reliability for the FSCQ, McDonald's omega was employed to reflect the comprehensive  
239 reliability of the whole scale and three subscales. This analysis yielded reliability coefficients  
240 of .77, .82, .78, and .88, respectively. These figures represent the maximal reliability  
241 (McDonald's omega coefficient), indicative of the extent to which the latent constructs within  
242 the FSCQ are consistently reproduced through their measured indicators (Hancock &  
243 Mueller, 2001).

244 Also, we calculated the corrected item-total correlations and inter-item correlations of  
245 the FSCQ. The corrected item-total correlations for the 10 items of the FSCQ were as  
246 follows: FSCQ1 had a correlation of .389, FSCQ2 was .537, FSCQ3 was .516, FSCQ4 was  
247 .554, FSCQ5 was .483, FSCQ6 was .474, FSCQ7 was .493, FSCQ8 was .471, FSCQ9 was  
248 .501, and FSCQ10 was .493. These values suggest that each item is moderately to strongly  
249 correlated with the overall scale, indicating that all items contribute adequately to the internal  
250 consistency of the FSCQ but without suggesting any item is redundant.

251 Table 2 shows the inter-item correlation matrix for the 10 items of FSCQ, which was  
252 analyzed to evaluate the relationships between items within each of the three identified  
253 dimensions. The correlations between these items ranged from -0.012 to 0.739. Items within  
254 the Similarity dimension demonstrated moderate to strong correlations with each other, such  
255 as the robust correlation between FSCQ1 and FSCQ3 ( $r = 0.582$ ) and the strong correlation  
256 between FSCQ2 and FSCQ3 ( $r = 0.591$ ), suggesting that these items consistently measure the  
257 same underlying construct. Within the Vividness dimension, the correlations were notably  
258 strong, particularly between FSCQ6 and FSCQ7 ( $r = 0.561$ ), indicating a cohesive  
259 measurement of vividness across these items, with FSCQ5 and FSCQ6 also showing a  
260 moderate correlation ( $r = 0.505$ ), further supporting the consistency within this dimension.  
261 The Positivity dimension exhibited the strongest correlations among its items, especially

262 between FSCQ8 and FSCQ9 ( $r = 0.739$ ) and FSCQ9 and FSCQ10 ( $r = 0.709$ ), suggesting that  
263 the items within this dimension are closely aligned in measuring the same positive affect  
264 construct. Correlations between items from different dimensions were generally lower,  
265 indicating distinctness between the dimensions, as exemplified by the very low correlation  
266 between FSCQ1 (Similarity) and FSCQ7 (Vividness) ( $r = -0.012$ ), which reflects the  
267 divergent nature of these dimensions. Overall, the inter-item correlation matrix supports the  
268 three-dimensional structure of the FSCQ, with higher correlations within dimensions and  
269 lower correlations across dimensions, confirming the distinctiveness of the Similarity,  
270 Vividness, and Positivity constructs.

271         These results collectively underscore the FSCQ's reliability, with the overall scale  
272 and each of its subscales demonstrating good internal consistency.

### 273 *Confirmatory Factor Analysis (CFA) of the FSCQ*

274         A confirmatory factor analysis was conducted on the FSCQ using the same sample of  
275 329 participants. The analysis was performed utilizing the maximum likelihood estimation  
276 method within Amos 29.0 software. During the data collection phase, we encountered only  
277 one missing value. We addressed missing values using the Mean Imputation method, which  
278 is appropriate for datasets with a low percentage of missing data. This approach ensured that  
279 missing values were effectively handled without introducing significant bias into our results.  
280 In addition, given the aim of replicating the three-factor structure reported in the original  
281 scale development by Sokol & Serper (2020), in line with the original study, our CFA strictly  
282 adhered to the specified model without any modifications. Specifically, we did not allow  
283 error terms to covary or implement any additional adjustments. This approach ensures that  
284 our analysis directly mirrors the methodology used in the original scale development,  
285 facilitating a clear comparison between our results and those previously reported.

286 To evaluate the model's structural integrity, we adhered to established criteria for  
287 assessing goodness-of-fit indices (Byrne, 2013; Hair et al., 2010; Hu & Bentler, 1999). Byrne  
288 (2013) suggested that a model exhibits a favorable fit when specific indices meet or exceed  
289 certain thresholds. In our analysis, the Goodness of Fit Index (GFI), Adjusted Goodness of  
290 Fit Index (AGFI), and Normed Fit Index (NFI) all exceeded .9. Additionally, the  
291 Comparative Fit Index (CFI) exceeded .93, and the Root Mean Square Error of  
292 Approximation (RMSEA) was maintained below .06, indicating a good model fit (for  
293 detailed statistics, see Table 3).

294 The model's good fit was further supported by both unstandardized and standardized  
295 factor loadings along with their corresponding standard errors (SE), as presented in Table 3.  
296 The standardized factor loadings showed that nine items exceeded .7, denoting significant  
297 associations with their respective factors. Although the standardized factor loading of FSCQ1  
298 is slightly lower, its proximity to .7 makes it acceptable. The unstandardized loadings provide  
299 raw estimates of these relationships, while the standardized estimates allow for comparison  
300 across variables. This was complemented by the Average Variance Extracted (AVE) values  
301 for each factor, all of which were higher than .5. These results align with the standards set by  
302 Hair et al. (2010) for establishing convergent validity. Consequently, the findings from our  
303 confirmatory factor analysis not only showed the good fit of the FSCQ model but also  
304 underscore its strong convergent validity. No indirect or interaction effects were included in  
305 this model.

306 According to the recommendations from Hair et al. (2010), the construct reliability  
307 was further assessed through the computation of Composite Reliability (CR) scores. The  
308 values of Composite Reliability play a crucial role in confirming the internal consistency and  
309 reliability of the constructs within a scale. Table 3 shows the results of the Composite  
310 Reliability (CR). Specifically, the CR values for the "similarity" and "positivity affect to the

311 future self” dimensions were exceptionally strong, exceeding the recommended threshold of  
312 .7. The “similarity” dimension showed a CR value of .72, the “positivity affect to the future  
313 self” dimension was .80. The “vividness” dimension, although slightly below the ideal  
314 standard with a CR of .67, was still within the acceptable range, being close to .7.

### 315 ***Discriminant Validity***

316 In our study, we also examined discriminant validity (see Table 3). The assessment of  
317 internal discriminant validity involved evaluating the Maximum Shared Variance (MSV) and  
318 the Average Variance Extracted (AVE) for each factor. The findings showed that the MSV  
319 was less than the AVE for every factor, and the square root of the AVE exceeded the  
320 correlations between constructs, signifying adequate internal discriminant validity (Hair et  
321 al., 2010).

322 In conclusion, the measurement model demonstrates a strong fit, showing the  
323 instrument’s good construct validity, along with its convergent and discriminant validity and  
324 excellent internal consistency.

### 325 **Phase 2: Convergent and Divergent Validity**

326 In our online survey we included four additional self-report measures that we  
327 predicted would correlate with the FSCQ to examine its concurrent validity. We predicted  
328 positive correlations (i.e., convergent validity) with the Future Self-Continuity Scale (FSCS),  
329 the Consideration of Future Consequences (CFC-14) Scale and the Multidimensional  
330 Temporal Self-Continuity Scale (MTSCS) and a negative correlation (i.e., divergent validity)  
331 with the Beck Hopelessness Scale (BHS). Details of each of these measures and their  
332 predicted correlations with the FSCQ are provided below.

**333 Measures**

334 *Future Self-Continuity Questionnaire (FSCQ)*. For a Detailed Description of this  
335 Questionnaire, Please Refer to Phase 1.

336 *Future Self-Continuity Scale (FSCS)*. The Future Self-Continuity Scale (FSCS) is a  
337 single item index of FSC that uses overlapping circles to assess similarity with the future self  
338 (Ersner-Hershfield, Garton, et al., 2009). Participants choose the pair of circles that most  
339 accurately represents their perceived similarity and connection to their self, ten years into the  
340 future. Additionally, they evaluate the degree of care and liking they feel for their future self,  
341 using 7-point Likert scales. Both the “caring” and “liking” scales are anchored with  
342 descriptive terms at each of the seven intervals; for instance, the “caring” scale spans from  
343 1(*don't care at all*) to 7(*completely care*). The reliability of the FSCS in our sample was .66.  
344 We started by analyzing the relationship between the FSCS and the FSCQ, as both measures  
345 assess similarity to the future self (Ersner-Hershfield, Garton, et al., 2009). Consequently, we  
346 hypothesized a moderate-strength correlation between the two instruments, specifically that  
347 the FSCQ and FSCS will have a moderate, positive correlation (i.e.  $r > .5$  and  $r < .75$ ).

348 *Consideration of Future Consequences (CFC-14)*. This instrument developed by  
349 Joireman et al. (2012), is a self-report measure consisting of 14 items. This scale aims to  
350 evaluate the degree to which individuals consider the potential future outcomes of their  
351 current behavior and the impact of these anticipated consequences on their decisions. The  
352 scale comprises two subscales: CFC-Future, measuring the extent to which individuals  
353 consider the future consequences of their behavior (e.g., I consider how things might be in  
354 the future, and try to influence those things with my day to day behavior) and CFC-  
355 Immediate, assessing the degree of consideration given to immediate consequences (e.g., I  
356 only act to satisfy immediate concerns, figuring the future will take care of itself). Each  
357 subscale includes 7 items, and responses are rated on a 7-point Likert scale, ranging from 1

358 (*very uncharacteristic of me*) to 7 (*very characteristic of me*). For scoring purposes, items on  
359 the CFC-Immediate subscale are reverse-scored. In our sample, the CFC-14 and its two  
360 subscales demonstrated good internal consistency (CFC Cronbach's alpha =.86, CFC-Future  
361 Cronbach's alpha =.85, CFC-Immediate Cronbach's alpha=.86). If people perceive a high  
362 degree of continuity between their present and future selves, they will be more concerned  
363 about the consequences of their future behavior. Thus, we hypothesized that the FSCQ and  
364 CFC-14 would share a low to moderate positive relationship (specifically,  $.24 < r < .5$ ).

365 *Multidimensional Temporal Self-Continuity Scale (MTSCS)*. The MTSCS which was  
366 developed by Wang (2022) consists of 30 self-report items. This scale is designed to measure  
367 individual differences in temporal self-continuity as it relates to psychological functioning  
368 and assesses two types of temporal self-continuity: Past Self-Continuity (PSC) and Future  
369 Self-Continuity (FSC), with each section comprising 15 items. The scale is divided into three  
370 dimensions: Similarity, Vividness, and Desirability. Each dimension is further divided into  
371 two subscales, resulting in six subscales in total: Past Self-Similarity (P-S) (e.g., How similar  
372 is your personality now to what it was like 10 years ago?), Past Self-Vividness (P-V) (e.g.,  
373 How vividly can you remember what your personality was like 10 years ago?), Past Self-  
374 Desirability (P-D) (e.g., How much do you like your personality 10 years ago?), Future Self-  
375 Similarity (F-S) (e.g., How similar is your personality now to what it will be like 10 years  
376 from now?), Future Self-Vividness (F-V) (e.g., How vividly can you imagine what your  
377 personality will be like 10 years from now?), and Future Self-Desirability (F-D) (e.g., How  
378 much do you like your personality 10 years from now?). Each dimension includes 10 items,  
379 with each subscale comprising 5 items. In our sample, the overall reliability of the MTSCS  
380 was .77, with a reliability of .83 for PSC and .73 for FSC. Assessing individuals' perceptions  
381 of their past, present, and future selves across various dimensions offers a comprehensive  
382 framework for validating the effectiveness of the FSCQ. Given the theoretical foundation and

383 construct definitions of both scales, it was hypothesized that there would be a positive  
384 correlation between the MTSCS and the FSCQ. However, considering the distinct  
385 dimensions and facets that each scale explores within the broader concept of self-continuity,  
386 the hypothesis posits that this relationship will vary from low to moderate in strength  
387 (specifically,  $.24 < r < .5$ ).

388 *Beck Hopelessness Scale (BHS)*. The BHS serves as a psychological assessment tool  
389 designed to measure the degree of an individual's pessimism or negative expectations  
390 regarding the future (Beck et al., 1974). The scale contains 20 items, answered with "yes" or  
391 "no", with 9 positively worded items requiring reverse scoring (scored as 0 for "yes" and 1  
392 for "no"), e.g., "I have great faith in the future". For items reflecting negative attitudes (e.g.,  
393 The future seems vague and uncertain to me), 1 point is assigned for "yes" responses and 0  
394 points for "no" responses. The total score is calculated by summing the responses for all 20  
395 items (range 0-20), with higher scores indicating higher levels of despair and negative  
396 expectations of the future. In our sample, the scale demonstrated a reliability of .73. The  
397 FSCQ, along with the scales mentioned earlier, aims to measure the continuity between an  
398 individual and their future self. In contrast, the BHS quantifies the level of despair or  
399 negative expectations about the future, potentially reflecting a lesser connection to the future  
400 (Beck et al., 1974). In other words, the higher levels of hopelessness, as measured by the  
401 BHS, were hypothesized to be associated with lower levels of perceived continuity with the  
402 future self, as measured by the FSCQ. We therefore anticipated a moderate negative  
403 correlation between the FSCQ and the BHS, with an expected range of  $-.24 < r < -.5$ .

#### 404 **Results**

405 To examine the relationships between the FSCQ and its subscales with other relevant  
406 psychological measures (FSCS, CFC-14, MTSCS, and BHS), a correlation matrix with the

407 full FSCQ and subscales with all four measures were calculated (see Table 5).

408         The FSCQ showed a significant positive correlation with the FSCS ( $r = .600$ ,  $p$   
409  $< .001$ , 95% CI [.53, .67]), indicating a moderate to strong relationship between the two  
410 measures. This suggests that those participants who score high on the FSCQ, indicating a  
411 strong sense of continuity with their future selves, also tend to score high on the FSCS. The  
412 subscales of the FSCQ also demonstrated significant positive correlations with the FSCS:  
413 similarity to future self ( $r = .369$ ,  $p < .001$ , 95% CI [.27, .46]), vividness to future self ( $r =$   
414  $.449$ ,  $p < .001$ , 95% CI [.36, .53]), and positive affect to future self ( $r = .495$ ,  $p < .001$ , 95%  
415 CI [.41, .57]).

416         When correlated with the CFC-14, the overall FSCQ showed a modest positive  
417 correlation ( $r = .306$ ,  $p < .001$ , 95% CI [.19, .41]). Among the subscales, vividness to future  
418 self showed a significant correlation with the CFC-14 ( $r = .234$ ,  $p < .001$ , 95% CI [.12, .39]),  
419 and positive affect to future self showed a moderate correlation ( $r = .372$ ,  $p < .001$ , 95% CI  
420 [.26, .47]). However, similarity to future self did not show a significant correlation with the  
421 CFC-14 ( $r = .090$ ,  $p = 0.154$ , 95% CI [-.03, .21]).

422         Correlations with the MTSCS were all significant and positive, suggesting a  
423 consistent relationship between the sense of continuity with the future self and the  
424 multidimensional aspects of temporal self-continuity. The FSCQ showed a correlation of .486  
425 ( $p < .001$ , 95% CI [.39, .57]), with the subscales showing correlations ranging from .335 ( $p <$   
426  $.001$ , 95% CI [.29, .43], for similarity to future self) to .366 ( $p < .001$ , 95% CI [.26, .46], for  
427 vividness to future self) and .362 ( $p < .001$ , 95% CI [.26, .46], for positive affect to future  
428 self).

429         In contrast, the correlations with the BHS were negative, indicating an inverse  
430 relationship between the sense of continuity with the future self and feelings of hopelessness.  
431 In other words, people's higher level of FSC is associated with a lower level of despair about

432 the future. The overall FSCQ scale showed a significant negative correlation with the BHS ( $r$   
433 =  $-.281$ ,  $p < .001$ , 95% CI [ $-.38$ ,  $-.17$ ]). Similarly, the vividness to future self ( $r = -.262$ ,  $p <$   
434  $.001$ , 95% CI [ $-.37$ ,  $-.15$ ]) and positive affect to future self ( $r = -.339$ ,  $p < .001$ , 95% CI [ $-.44$ ,  
435  $-.24$ ]) subscales also showed significant negative correlations. However, the similarity to  
436 future self subscale did not show a significant correlation with the BHS ( $r = -.046$ ,  $p = 0.427$ ,  
437 95% CI [ $-.16$ ,  $-.07$ ]).

438 In summary, the results demonstrate that the FSCQ and its subscales generally show  
439 positive and significant correlations with measures of FSC and consideration of future  
440 consequences, and negative correlations with a measure of pessimism or hopelessness.

#### 441 Discussion

442 Phase 1 of our study aimed to evaluate the psychometric properties of the Future Self-  
443 Continuity Questionnaire (FSCQ), investigating its reliability, concurrent validity and  
444 construct validity (i.e. factor structure). The item frequencies results reveal a complex set of  
445 attitudes towards the future, with individuals tending to see their future beliefs, personality,  
446 and values as different to their current state. However, a significant portion could envisage  
447 their future with a degree of clarity and attitudes towards future actions, self, and personality  
448 were generally positive, with over 70% of the respondents expressing a liking for their  
449 anticipated future state. The interconnected nature of the dimensions within the FSCQ  
450 highlights that perceptions of similarity, vividness, and positivity to one's future self are  
451 interrelated constructs. At the same time correlations among the three subscales are all small  
452 (i.e.  $< .4$ ) suggesting that each subscale measures a distinct aspect of FSC.

453 The findings support the reliability and validity of the FSCQ, aligning with  
454 Hershfield's (2011) model of FSC and extending its applicability to a New Zealand  
455 population. The FSCQ demonstrated strong internal consistency across its total scale and  
456 subscales, confirming previous research findings (Sokol & Serper, 2020; Zhang et al., 2022).

457 While our findings support the reliability and validity of the FSCQ in a New Zealand sample,  
458 a significant limitation of this study is the inability to test measurement invariance across  
459 cultures. Although the confirmatory factor analysis further validated the three-factor structure  
460 of similarity, vividness, and positive affect, consistent with Sokol and Serper's (2020) study  
461 with a North American sample, replicability of the factor structure does not ensure that these  
462 constructs hold exactly the same meaning and interpretation among respondents from diverse  
463 cultural backgrounds. According to Sokol and Serper (2020), the validity of the FSCQ should  
464 be assessed across individuals within a specific culture. This limitation is crucial because  
465 New Zealand's unique cultural landscape, characterized by its indigenous Māori population  
466 and a variety of other ethnic groups, may influence how individuals perceive and respond to  
467 the items on the FSCQ.

468 Phase 2 of our study investigated if the FSCQ had a substantial relationship with other  
469 measures of different constructs all relevant to the notion of FSC. The FSCQ's positive  
470 correlations with the FSCS, CFC-14, and MTSCS, and negative correlations with the BHS,  
471 support its convergent and divergent validity.

472 Significantly, the moderate to strong correlations observed between the FSCQ and its  
473 three dimensions with the FSCS underscore the effectiveness of the FSCQ in assessing FSC.  
474 This outcome aligns with expectations, given that the theoretical frameworks underpinning  
475 both the FSCS and the FSCQ share a common foundation (Ersner-Hershfield, Garton, et al.,  
476 2009; Hershfield, 2011; Sokol & Serper, 2020). Furthermore, the strong correlation between  
477 the FSCQ and the FSCS suggests that these instruments, while distinct in their specific items  
478 and focus, similarly capture the essence of FSC. This alignment provides empirical support  
479 for the use of these measures in both research and practical settings to assess the degree to  
480 which individuals feel connected with their future selves.

481           Our analysis also indicated a low to moderate positive correlation between the FSCQ  
482 and the CFC-14. This finding is in line with the results of Sokol and Serper (2020), who also  
483 reported a low to moderate positive association between these two constructs. This result  
484 suggests that individuals who have a stronger connection with their future selves tend to  
485 exhibit a higher level of consideration for future consequences. On the other hand, the  
486 subscales of vividness and positive affect demonstrated stronger correlations with the CFC-  
487 14 compared to the similarity subscale. This may indicate that simply perceiving similarity  
488 with one's future self might not robustly predict the consideration of future consequences.  
489 Instead, the capacity to vividly visualize and sustain a positive emotional bond with one's  
490 future self appears to amplify an individual's inclination to contemplate the long-term  
491 impacts of their behavior.

492           Regarding the MTSCS, we found that the FSCQ was moderately associated with the  
493 MTSCS. This finding indicates that individuals who exhibit a stronger connection with their  
494 future self tend to report higher levels of temporal self-continuity. The significant correlations  
495 between the FSCQ subscales and the MTSCS suggest that specific aspects such as perceived  
496 similarity, the vividness of future self-imagery, and positive feelings towards the future self  
497 are important components of temporal self-continuity. The vividness subscale exhibited the  
498 strongest correlation, highlighting the importance of clear and detailed future self-  
499 visualization in fostering a sense of continuity across time. Moreover, this finding contributes  
500 to the theoretical understanding of self-continuity, suggesting that FSC is an integral part of  
501 how individuals perceive their identity over time (Rutt & Lóckenhoff, 2016; Sedikides et al.,  
502 2023).

503           Our study also observed that the FSCQ and its different dimensions exhibit a negative  
504 correlation with the BHS. Among these correlations, positive affect exhibited the strongest  
505 association with the BHS, followed by vividness, whereas similarity had the least impact on

506 the overall BHS. These findings are consistent with Sokol and Serper's (2020) results. The  
507 negative correlation between the FSCQ and the BHS suggests that individuals who perceive  
508 their future selves as a continuation of their current selves may experience lower levels of  
509 hopelessness. This relationship may arise from a sense of continuity and stability in one's  
510 life, which could foster a positive outlook towards the future. Alternatively, given that  
511 hopelessness is strongly linked to depression, it might be that people with low mood struggle  
512 to maintain a coherent and robust image of their self in the future. Furthermore, the negative  
513 correlations between vividness of the future self and the BHS and between positive affect  
514 towards the future self and the BHS suggest that the more vividly individuals can imagine  
515 their future selves and the more positive affect they have towards their future selves, the less  
516 hopelessness they report. These findings could be interpreted within the framework of  
517 proactive coping and future planning; a clear and positive vision of the future can be a  
518 motivational force that reduces feelings of despair and hopelessness.

### 519 **Implications of the Study**

520 From a theoretical perspective, the psychometric evaluation of the FSCQ has several  
521 important implications in psychology and related fields. To our knowledge, this is the first  
522 time that the original (English) version of the FSCQ has been rigorously examined for its  
523 psychometric properties outside the United States (See the Supplementary Table 1). The  
524 confirmation of the FSCQ's reliability and construct validity within New Zealand's unique  
525 sociocultural context enriches the existing literature on FSC by demonstrating the  
526 questionnaire's applicability across a different cultural setting (Ersner-Hershfield, Garton, et  
527 al., 2009; Sokol & Serper, 2017, 2020). This cross-cultural validation points to the FSCQ  
528 being a robust tool for measuring individuals' perceptions of their continuity with their future  
529 selves, with the potential to facilitate international research collaborations and comparative



554 demographic groups, or the interest and willingness of these groups to participate in  
555 psychological research. It is also possible that the channels through which participants were  
556 recruited (e.g., online platforms, university settings) may have a demographic skew that does  
557 not mirror the general population. In future research, efforts should be made to obtain a more  
558 representative sample that aligns closely with the demographic makeup of New Zealand. This  
559 could involve targeted recruitment strategies to increase participation among  
560 underrepresented groups, especially the European demographic and middle-aged or older  
561 individuals, to ensure that the evaluation of the FSCQ is reflective of the entire population.  
562 Addressing this limitation is crucial for enhancing the external validity of the research and  
563 ensuring that the FSCQ can be effectively utilized across diverse communities.

564         Additionally, our current analysis utilized traditional descriptive methods to explore  
565 the varying levels of difficulty across the FSCQ items, but we acknowledge that these  
566 methods may not fully capture the nuances of item difficulty. A more sophisticated approach,  
567 such as Item Response Theory (IRT), would provide a deeper and more precise  
568 understanding of item difficulty. We intend to incorporate Rasch analysis in future studies to  
569 more accurately assess item difficulty, test for differential item function (DIF) across  
570 demographic groups and to provide a more comprehensive evaluation of the psychometric  
571 properties of the questionnaire (Rasch, 1993; Hagquist et al., 2009; Pallant & Tennant, 2007).

572         The cross-sectional nature of our research provides only a snapshot, limiting our  
573 capacity to track the progression of FSC across different life stages or how it impacts long-  
574 term outcomes. Longitudinal designs, therefore, stand out as a crucial next step, to uncover  
575 the dynamics of FSC over time. These studies can shed light on its potential as a predictor of  
576 various psychological, social, and health-related outcomes.

577         Future research should consider developing and testing interventions aimed at  
578 improving or training FSC by focusing on its most influential dimensions. Given the

579 preliminary evidence pointing towards the significant role of vividness, it stands to reason  
580 that interventions designed to enhance the vividness of individuals' FSC might yield  
581 substantial benefits in promoting future-oriented behaviors. Indeed, several studies have  
582 already explored interventions targeting FSC, particularly through vividness exercises. For  
583 example, virtual reality (VR) has been used to create immersive experiences that allow  
584 individuals to interact with a vivid representation of their future selves, demonstrating  
585 significant effects on decision-making and future-oriented behaviors (van Gelder et al.,  
586 2013). Additionally, narrative approaches, such as those used in psychotherapy for suicidal  
587 symptoms, have been shown to help individuals develop a more vivid and cohesive future  
588 self, which in turn reduces suicidal thoughts (Levin et al., 2023). Other intervention, such as  
589 letter writing exercises aimed at enhancing health behaviors have also contributed to  
590 increasing vividness and strengthening FSC (Rutchick et al., 2018). However, unlike  
591 previous studies, which have typically focused on specific applications such as mental health,  
592 our research suggests a broader applicability of vividness-enhancing interventions across  
593 various domains of future-oriented behavior. Therefore, future research should not only  
594 continue to explore these existing approaches but also investigate novel techniques and  
595 broader applications of vividness training. For example, integrating guided imagery with  
596 other visualization techniques could further enhance the vividness with which individuals  
597 envision their future selves, thereby potentially amplifying the benefits of FSC across  
598 different contexts.

599         In conclusion, the results of our study have demonstrated that the FSCQ is a reliable  
600 and valid multidimensional tool for measuring FSC, with significant associations with related  
601 psychological constructs. This study not only supports the utility of the FSCQ in other  
602 cultural contexts but also opens avenues for further research into the role of FSC in  
603 psychological well-being and health promotion. In the future, psychologists and policy

604 makers may develop interventions aimed at fostering a positive future orientation and  
605 evidence-based practices that enhance a stronger sense of continuity with the future self,  
606 ultimately promoting healthier and more sustainable behaviors.

607 **Data availability statement**

608 The corresponding author can provide the data upon a reasonable request.

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**Table 1***Descriptive Statistics and Item Frequencies for FSCQ.*

Item	Content (Dimension)*	Mean	SD	Skewness	Kurtosis	Item frequencies (Percentage %)					
						1	2	3	4	5	6
9	Do you like what your personality will probably be like 10 years from now? (P)	3.55	1.54	-.158	-.972	14.0	11.2	22.8	20.4	21.3	10.3
8	Do you like what you will be like 10 years from now? (P)	3.52	1.25	-.048	-.379	6.4	12.5	31.0	28.6	15.8	5.8
4	How similar are your values now to what they will be like 10 years from now? (S)	3.39	1.32	.006	-.759	7.9	19.8	24.6	25.8	17.0	4.9
7	How vividly can you imagine what your family relationships will be like in 10 years from now? (V)	3.36	1.47	.026	-.966	12.5	18.8	21.3	22.2	17.6	7.6
10	Do you like what your actions will probably be like 10 years from now? (P)	3.35	1.25	-.071	-.623	8.2	16.4	30.1	25.5	17.0	2.7
2	How similar are your beliefs now to what they will be like 10 years from now? (S)	3.33	1.32	.070	-.808	7.9	22.8	23.1	25.5	16.1	4.6
5	How vividly can you imagine what you will be like in 10 years from now? (V)	3.18	1.22	.001	-.646	9.1	21.3	28.0	27.7	12.2	1.8
3	How similar is your personality now to what it will be like 10 years from now? (S)	3.18	1.26	.066	-.665	9.7	21.9	26.7	26.4	12.5	2.7

Item	Content (Dimension)*	Mean	SD	Skewness	Kurtosis	Item frequencies (Percentage %)					
						1	2	3	4	5	6
6	How vividly can you imagine what you will look like in 10 years from now? (V)	3.10	1.23	.138	-.619	9.7	23.7	28.9	24.0	11.6	2.1
1	How similar are you now to what you will be like 10 years from now? (S)	3.03	1.57	.366	-.960	20.1	22.8	21.0	14.6	13.1	8.5

*Note.* \*S= Similarity, V= Vividness, P= Positivity; Items of **similarity** to the future self are rated from 1 = completely different, 2 = somewhat different, 3 = a little different, 4 = similar, 5 = very similar, 6 = exactly the same; Items of **vividness** to the future self and **positive affect** to the future self are rated from 1 = not at all, 2 = not very well, 3 = somewhat, 4 = pretty well, 5 = very strongly, 6 = perfectly.

**Table 2***Inter-Item Correlation Matrix of FSCQ.*

Item	1	2	3	4	5	6	7	8	9	10
1	1.000									
2	.483	1.000								
3	.582	.591	1.000							
4	.465	.589	.567	1.000						
5	.271	.231	.215	.215	1.000					
6	.200	.193	.234	.247	.505	1.000				
7	.150	.171	.171	.217	.539	.561	1.000			
8	-.012	.192	.108	.219	.226	.223	.266	1.000		
9	.038	.231	.169	.230	.236	.242	.252	.739	1.000	
10	.045	.244	.155	.263	.216	.213	.229	.632	.709	1.000

**Table 3***FSCQ confirmatory factor model fit and reliability and validity assessment.*

Factors	Items	Unstandardized Factor Loadings	Standardized Factor Loadings	SE	Composite Reliability (CR)	Average Variance Extracted (AVE)	Maximum Shared Variance (MSV)
Similarity	1	1.000	.669		.72	.549	.142
	2	.954	.758	.087			
	3	.951	.794	.080			
	4	.927	.738	.087			
Vividness	5	1.000	.707		.67	.537	.143
	6	1.046	.731	.102			
	7	1.302	.759	.124			
Positivity affect	8	1.000	.813		.80	.698	.143
	9	1.378	.907	.081			
	10	.963	.718	.063			

*Note.* Fit indices:  $\chi^2/df= 1.554$ ; GFI= .969; AGFI= .947; NFI= .963; CFI= .987; RMSEA= .041;  $p < .001$ .

**Table 4***Discriminant validity of FSCQ's three dimensions.*

	Similarity	Vividness	Positivity affect
Similarity	.741		
Vividness	.378	.733	
Positivity affect	.261	.377	.835

*Note.* The diagonal value represents the square root of the Average Variance Extracted (AVE).

**Table 5***Correlation Matrix for FSCQ, Subscales, and 4 Measures of Interest.*

Variable	1	2	3	4	5	6	7	8
1. FSCQ (Total)	1							
2. FSCQ Similarity	.761*	1						
3. FSCQ Vividness	.708*	.307*	1					
4. FSCQ Positivity	.683*	.209*	.316*	1				
5. FSCS	.600*	.369*	.449*	.495*	1			
6. CFC-14	.306*	.090	.234*	.372*	.408*	1		
7. MTSCS	.486*	.335*	.366*	.362*	.442*	.376*	1	
8. BHS	-.281*	-.046	-.262*	-.339*	-.212*	-.272*	-.197*	1

*Note.* FSCS = Future Self-Continuity Scale (FSCS), CFC-14 = Consideration of Future Consequences Scale, MTSCS = Multidimensional Temporal Self-Continuity Scale, BHS = Beck Hopelessness Scale. \* $p < .001$ .

(9543 words)