Psychological Thought
psyct.swu.bg | 2193-7281
South-West University "Neofit Rilski"

Research Article

The Relationship between the Frequency of Future Self-Thoughts on Mental Health: The Moderating Role of Clarity of Future Self-Thoughts

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Abstract

Future-oriented thoughts can be adaptive or maladaptive to one's mental health depending on the type of self-construal that is salient. Although individual differences in the frequency of future-self-related thoughts are recognised and associated with different mental health outcomes, less is known about the moderating effects of the clarity of these thoughts on this relationship. This study used standard (direct) multiple regression analyses to examine the potential moderating role of clarity on the relationship between frequency and mental health among an online student sample. The study found future clarity moderated the effect of future frequency on the mental health measure of anxiety but not depression or stress. Further research in this area may assist the development of new cognitive treatments for mental health.

Keywords: Self-thought clarity; Self-thought frequency; Mental health; Self-thoughts; Depression; Anxiety.

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Psychological Thought, 2023, Vol. 16(1), 135-155, https://doi.org/10.37708/psyct.v16i1.752
Received: 2022-06-24. Accepted: 2023-01-16. Published (VoR): 2023-04-30.
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Mental health disorders including depression and anxiety are most prevalent amongst young adults, with over one in four living with a disorder at any given time (Nochaiwong et al., 2021). Young adults make up a significant portion of tertiary students attending university and are also approximately three times more likely to be experiencing anxiety and depression than the average person (Evans et al., 2018). How university students perceive their future-selves is therefore likely to have important and differential consequences for their mental health. Research has also implicated conscientiousness as a pronounced trait among tertiary students. Tertiary students are also a population that often contemplates the future, given their post-study outcomes and/or employment prospects are uncertain. Consistent with this, students often rate feelings of uncertainty about the future amongst their greatest and most frequently experienced life stressors (Wu et al., 2020).

The quality of future-self-related thoughts can benefit mental health when positive and adaptive or harm mental health when negative and maladaptive, depending on the type of future self-construal that is salient (Blouin-Hudon & Pychyl, 2015; Hallford et al., 2018; Moss et al., 2018). For example, both hope and anxiety are germane to thoughts about the future-self (McElwee & Haugh, 2010) and conscientious individuals readily imagine feared future-selves as well as hoped-for future-selves (Massey-Abernathy & Robinson, 2019). Future clarity and future frequency are two studied qualities apparent when one cognises their future selves (McElwee & Haugh, 2010). Future clarity refers to the ability to imagine one's future vividly and with certainty, replete with rich, specific, and tangible details, whereas future frequency refers to how often one imagines themselves in the future (McElwee & Haugh, 2010). The relationship between future clarity, future frequency and mental health are commonly observed, less observed is the interaction between these two aspects of future self-thought in relation to mental health.

Future Frequency

Future frequency is less studied but is often associated with negative, maladaptive mental health and an increase in persistent self-thoughts (McElwee & Haugh, 2010). Viewing the future frequently is linked to depression to the point of rumination (Andersen et al., 1992; Gamble et al., 2019; Hjartarson et al., 2022). A high frequency of automatic thoughts about negative future possibilities has also been associated with anxiety above and beyond variables that may appear to be measuring similar constructs (Beck et al., 1987). For example, measuring a general predisposition towards thinking about the future, as compared to thinking specifically about the future-self; or a general predisposition towards negative affect, as compared to having depressive symptoms (McElwee & Haugh, 2010). While future frequency is positively associated with negative affect and greater habitual self-thoughts, it is possible not all future-self thoughts are maladaptive. In fact, frequent adaptive future thoughts (e.g., an optimistic and careful consideration of future consequences) could be beneficial (D'Argembeau et al., 2011). Future frequency is also often conceptualised through more conventional measures, such as self-reported diaries (Berntsen & Jacobsen, 2008) and other non-future-self-specific measures (i.e., daydreaming) where the future-self is omitted for a more general frequent future-thought focus (Stawarczyk et al., 2012). Given future frequency has not been researched as thoroughly as future clarity, there is a dearth of information about how the quality of a frequently occuring future-self thought may impact mental health.

Future Clarity

Future clarity is often associated with positive and adaptive mental health and behavioural outcomes including positive affect, optimism, life satisfaction, a future-time perspective, consideration of future consequences, and frequency of positive automatic thoughts (McElwee & Haugh, 2010). Future clarity has also been linked with making healthy choices including consuming healthy food, abstaining from cigarettes and participating in physical activity (Moss et al., 2018), mindfulness and consideration of future consequences (Moss, Wilson, et al., 2017), and decreased adaptability (Moss, Irons, et al., 2017).

The specific quality or characteristic of a thought may have significant implications for mental health, in a manner analogous to the relationship between weight management and eating habits. Eating a large amount of chocolate would lead to adverse weight management results, however eating an equivalent number of green vegetables would lead to positive results (Williams et al., 2015). Applying the weight management analogy to future clarity and future frequency – frequently thinking about a future-self that is clear and vivid could benefit mental

health and well-being, while frequently thinking about a hazy, uncertain future-self may be cognitively taxing and stressful.

Future Frequency and Future Clarity

Current literature tends to consider future clarity and future frequency's respective effects on mental health separately, and their potential for interaction remains under-researched. Both constructs demonstrate shared effects on several cognitive features and mental health facets, which build a case for an interaction. For example, temporal distance (a type of psychological distance) seems to interact with future clarity and future frequency in similar ways by impacting one's motivation to actualise the future-self, albeit for distinct reasons. Thoughts about the future-self are more frequent when the future-self is closer in temporal distance and are believed to encourage and motivate a plan of action (D'Argembeau et al., 2011; Trope & Liberman, 2003). Future clarity makes the future-self appear psychologically closer by enhancing the future-self-image and orienting perspectives, making the imaginer feel the clear and vivid future-self-image is tangible, achievable and more likely to manifest (D'Argembeau et al., 2011; Trope & Liberman, 2003). The shared effects of future clarity and future frequency are also evident (and often opposing) in relation to mental health outcomes. For example, future clarity and future frequency have demonstrated opposing effects on negative affect, anxiety, and negative automatic thoughts (McElwee & Haugh, 2010).

Considering the literature suggests future clarity is predominantly associated with positive and adaptive psychological functioning, whereas future frequency is associated with negative and maladaptive cognitions, there is a gap in the literature as to whether the positive effects of clear and vivid thoughts of a future-self can moderate the negative effects of frequently thinking about the future-self.

Objectives

This study therefore aims to investigate whether high levels of future clarity can moderate the established negative impact of future frequency on mental health among tertiary students (a cohort which displays traits of both frequently thinking about the future and an increased prevalence of poor mental health). The current study assessed three hypotheses. It examined whether future clarity moderated the negative effects of future frequency on three prominent facets of mental health; depression, anxiety and stress. Specifically, it assessed whether depression (Hypothesis 1; H1), anxiety (Hypothesis 2; H2) and stress (Hypothesis 3; H3) levels would be (a) highest for individuals with high levels of future frequency and low levels of future

clarity *and* (b) lowest for individuals with low levels of future frequency and high levels of future clarity.

Method

Participants and Design

A G*Power analysis (Faul et al., 2013) revealed that to achieve a power level of .80, using a medium effect size (f2) of .15, an alpha of .05, and six predictors (future frequency, future clarity, future frequency x future clarity, age, future time perspective and negative affect) the study design required 98 participants.

Participants were invited via an online survey through an advertisement containing a hyperlink on a university's student research experience program recruitment system. In total *N* = 168 completed the survey including 119 (71%) females and 49 (29%) males, aged between 18 and 74 years (*M* = 32.62, *SD* = 12.01).

Measures

Individual participant demographics (age, gender, level of education completed, country of birth), study load (part-time or full-time), study mode (online or on campus), course and major, study hours per week (contact hours and time spent on independent university study), average paid work hours per week, future thoughts, future frequency and mental health were measured and used in the present study.

Future-Self-Thoughts Questionnaire – FSTQ

The participants' future thoughts were measured and assessed using the Future-Self Thoughts Questionnaire (FSTQ) which is a 15-item self-report scale that evaluates specific aspects of future-self-thought: frequency and clarity. There are six items for frequency and five items for clarity, rated on a response scale ranging from 1 ('*not at all true for me'*) to 6 ('*completely true for me'*). Some items are reverse-coded. Total scores for each subscale are computed by summing all item ratings in the subscale. Higher scores indicate higher levels of the respective self-aspect. Clarity and frequency show reliabilities of .86 and .79 respectively (McElwee & Haugh, 2010).

Zimbardo Time Perspective Inventory – Future Subscale.

The 56-item, five-subscale, ZTPI measures individual differences in time-orientation. This study used the future subscale, which consists of 13-items with the goal of testing whether future-self-thought contributes to mental health over and above trait future orientation (the extent an

individual thinks about the future). Items are rated from 1 (‘*very uncharacteristic*’) to 5 (‘*very characteristic*’). Item scores are summed and divided by 13 and range from one to six. Higher scores indicate a higher trait future perspective. Internal consistency reliability is .80, and the subscale has high validity with university student samples (Zimbardo & Boyd, 2015).

Depression and Anxiety Stress Scale - 21

The participants’ mental health was assessed using the Depression, Anxiety, and Stress Scale (DASS-21) which is a 21-item self-report scale designed to measure the emotional states of depression, anxiety and stress. The DASS-21 has been extensively normed (Smith, 2017). Participants responded to items on a 4-point Likert response scale, ranging from 0 (‘*did not apply to me at all*’) to 3 (‘*applied to me very much or most of the time*’). There are seven questions designed to measure each state (e.g., depression, ‘I felt down-hearted and blue’, anxiety, ‘I felt I was close to panic’ and stress, ‘I found myself getting agitated’). Item scores were collated for each state and ranked from ‘normal’ to ‘extremely severe.’ Scores range from 0-42, for each subscale, and higher scores indicate higher levels of the emotional state (Lovibond & Lovibond, 1995). Reliabilities are .81 for depression, .89 for anxiety and .78 for stress, with high validity among university students (Coker et al., 2018).

Negative Affect Scale (PANAS) with General Time Instructions.

The participants’ affect was measured using the negative affect scale (PANAS) which is a self-report adjective checklist consisting of two 10-item mood scales, one measuring positive affect (e.g., proud) and the other measuring negative affect (e.g., ashamed). ‘General’ instructions for negative affect were used to measure current trait negative affect as a potential covariate. Participants responded to each item via a 5-point Likert Scale ranging from 1’ (‘*very slightly or not at all*’) to 5 (‘*extremely*’). Items are collated, and subscale scores range from 10 to 50. Higher scores indicate greater trait affect, respective to the scales (Watson et al., 1988). The PANAS has high reliability with students, with the positive affect scale ranging from .86 to .90 and the negative affect scale ranging from .84 to .87 (Thompson, 2007).

Procedure

Upon obtaining ethics approval from a local university’s human research ethics committee, the sample was invited to participate via convenience sampling from advertisements on a local university website. Participants were informed about the nature of the study, data handling and informed consent. Entry to the study required participants to be 18 years of age or older and provide digital consent. Participation was incentivised via course credit.

Data Analysis Strategy

This study employed a cross-sectional, correlational design to investigate clarity of future-self thought as a moderator of the relationship between frequency of future-self thought and mental health in a series of regression analyses. This study involved two predictor variables (future clarity (moderator) and future frequency) against three criterion variables (depression, anxiety, and stress). Potential covariates included differences in study mode, study load, university contact hours, independent university study hours, paid work hours, age, gender, trait negative affect and the future time orientation subscale of the Zimbardo Time Perspective Inventory (ZTPI).

Results

Data was analysed using SPSS Version 25. Seventeen cases were removed due to substantial missing data >30% (Tabachnick et al., 2007). This left 151 cases for analysis. Further data screening revealed 13 missing completely at random data values which were handled using Estimated Mean Substitution for correction (Tabachnick et al., 2007). Variables with nonsensical data that was reported inconsistently were deleted (e.g., course and major, study hours per week and average paid work hours per week produced a range of different response formats in response to the open-ended questions). Assumptions of normality, linearity and homoscedasticity were met.

Descriptive Statistics

Descriptive statistics for the study variables are displayed in Table 1. Future clarity, future frequency and future orientation scores were close to the midpoint on average. Average mental health scores were in the mild range for depression, anxiety and stress.

Table 1.
Survey Characteristics

Variable	*Theoretical Range*	*Obtained Ranges (min-max)*	*Mean*	*SD*	*Cronbach's Alpha*
DASS - Depression	0 - 42	0 - 42	9.72	10.25	.93
DASS - Anxiety	0 - 42	0 - 42	7.81	8.91	.89
DASS - Stress	0 - 42	0 - 42	13.31	9.05	.86
ZTPI Future	1 - 6	2.23 - 4.54	3.42	.45	.61
Negative Affect	10 - 50	10 - 46	19.71	8.24	.92
Study Mode	1 - 2	1 - 2	1.85	.36	N/A
Study Load	1 - 2	1 - 2	1.48	.50	N/A
Age	N/A	18 - 74	32.62	12.10	N/A
Future Clarity	5 - 30	5 - 30	17.99	6.14	.64
Future Frequency	6 - 36	6 - 36	22.86	6.97	.87

Note. Abbreviations are as follows: ZTPI = Zimbardo's Time Perspective Inventory

As represented in Table 2, future clarity correlated negatively and moderately with the three mental health outcomes, with a stronger association for depression. Conversely, future frequency had a weak, positive correlation with the three mental health outcomes. Negative affect correlated positively with the three mental health outcomes and future frequency, and negatively with future clarity. Other correlations with the outcome variable were weak to moderate (<.30) or non-significant and therefore were not controlled (Tabachnick et al., 2007).

Table 2.
Inter-correlations among Key Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	1											
2. Gender	.22	1										
3. Education	.34	.04	1									
4. Study Load	.30	.03	.36	1								
5. Study Mode	.44	.13	.28	.33	1							
6. ZTPI	.36	.08	.22	.12	.28	1						
7. Negative Affect	-.30	.08	-.07	-.25	-.13	-.25	1					
8. DASS - Depression	-.27	.11	-.12	-.17	-.21	-.33	.69	1				
9. DASS - Anxiety	-.35	.12	-.18	-.24	-.26	-.25	.73	.72	1			
10. DASS - Stress	-.24	.13	-.01	-.18	-.14	-.21	.73	.75	.74	1		
11. Future Clarity	.28	-.02	.09	.18	.24	.33	-.41	-.52	-.38	-.32	1	
12. Future Frequency	-.28	.12	.00	-.22	-.16	-.04	.33	.25	.28	.30	-.08	1

Note. $r > (.17)$ are significant at $\alpha = .05$; $r > (.21)$ are significant at $\alpha = .01$
Abbreviations are as follows: ZTPI = Zimbardo's Time Perspective Inventory

Main Analysis

The interactive effect of future clarity and future frequency in predicting the three mental health outcomes (H1, H2 and H3) was examined using three regression analyses for depression, anxiety, and stress respectively. To avoid multicollinearity, future clarity and future frequency were mean-centred and multiplied to compute the interaction term (Tabachnick et al., 2007). Each facet of mental health (depression, anxiety, and stress) was used as a separate criterion variable in three separate models. Covariates were entered in step one, for each model, and included ZTPI, negative affect and age. The main effects of (mean-centred) future clarity and future frequency were entered in step two followed by their interaction term at step three.

As presented in Table 3, there was no significant effect of the interaction between future clarity and future frequency on depression. R^2 was significantly different from zero at step one (R^2 = .50, F(3,147) = 49.86, p < .001) and step two (R^2 = .56, F(2,145) = 8.35, p < .001) but the final step produced a non-significant increase in R^2 (R^2 = .56, F(1,144) = 1.80, p = .18). In the final step, negative affect (20%, p < .001) and future clarity (5%, p < .001) significantly and negatively accounted for variance in depression. After all the variables were accounted for in the last step of the model, the accumulative proportion of variance explained in depression was 56.1% (adjusted 54.3%).

Table 3.
Regression Analysis Results for Depression Scores

Predictor	*β*	*t*	*p*	sr^2	*R*	R^2	R^2_{change}
Model 1					.71	.51	.50**
ZTPI	-.60	-2.54	.01*	.02			
Age	-.02	-.28	.7	.00			
Negative Affect	.65	10.47	.00**	.37			
Model 2					.75	.56	.05**
ZTPI	-.11	-1.82	.07	.01			
Age	.02	.35	.73	.00			
Negative Affect	.55	8.41	.00**	.22			
Future Frequency	.05	.82	42	.00			
Future Clarity	-.26	-4.06	.00**	.05			
Model 3					.75	.56	.01
ZTPI	-.11	-1.86	.07	.01			
Age	.02	.27	.79	.00			
Negative Affect	.54	8.17	.00**	.20			
Future Frequency	.05	.74	.46	.00			
Future Clarity	-.25	-4.01	.00**	.05			
FFxFC	-.08	-1.34	.18	.01			

Note. ZTPI = Zimbardo's Time Perspective Inventory, FFxFC = Interaction Term.
*p < .05. **p < .01.

Future clarity was also not found to moderate the relationship between future frequency and stress, as displayed in Table 4. R^2 was significant in the first step (R^2 = .54, F(3,147) = 56.74, p < .001), but not in the second (R^2 = .54, F(2,145) = .71, p = .49) or final step (R^2 = .56, F(1,144) = 1.38, p = .24). Negative affect statistically and negatively accounted for variance at all three steps (46%, p < .001; 35%, p < .001; 33%, p < .001). The accumulative proportion of variance explained in stress, after all variables were accounted for was 54.5% (adjusted 52.7%).

The interaction term failed to produce a significantly different increment in R^2 at the .05 level for depression or stress. Therefore, there is no evidence for moderating effects of future clarity in the relationships between future frequency and depression, and future frequency and stress[1].

Table 4.
Regression Analysis Results for Stress Scores

Predictor	*β*	*t*	*p*	sr^2	*R*	R^2	R^2_{change}
Model 1					.73	.54	.54**
ZTPI	-.02	-.28	.78	.00			
Age	-.02	-.27	.79	.00			
Negative Affect	.72	12.11	.00**	.46			
Model 2					.74	.54	.01
ZTPI	-.02	-.34	.74	.00			
Age	.00	.03	.97	.00			
Negative Affect	.70	10.49	.00**	.35			
Future Frequency	.07	1.17	.24	.00			
Future Clarity	-.02	-.32	.75	.00			
Model 3					.74	.54	.00
ZTPI	-.02	-.37	.71	.00			
Age	-.00	-.04	.97	.00			
Negative Affect	.68	10.24	.00**	.33			
Future Frequency	.07	1.10	.27	.00			
Future Clarity	-.02	-.27	.79	.00			
FFxFC	-.07	-1.18	.24	.00			

Note. ZTPI = Zimbardo's Time Perspective Inventory, FFxFC = Interaction Term.
**p < .01.

[1] Depression and stress did produce a statistically significant moderation effect in a reduced model where negative affect was not included as a covariate. The interaction was tested without covariates as an exploratory measure due to lack of power. See Appendix A and B.

Table 5 displays R^2, R^2 change and adjusted R^2 at each step for the regression analysis of future clarity as a moderator of the relationship between future frequency and anxiety. The regression equation at model one with the entry of covariates is $R^2 = .56$, $F(3, 147) = 61.59$, $p < .001$. After model two, with the addition of the two future thinking variables, the regression equation is $R^2 = .56$, $F(2, 145) = .66$, $p = .52$, suggesting the two variables did not significantly contribute to the variance in anxiety over and above the covariates. When the interaction term was added at final step of the regression equation, $R^2 = .58$, $F(1, 144) = 5.70$, $p = .018$, it indicated the interactive effect of future clarity and future frequency on anxiety added to the variance after controlling for negative affect, future time perspective and age and the main effects.

Table 5.
Regression Analysis Results for Anxiety Scores

Predictor	*β*	*t*	*p*	sr^2	*R*	R^2	R^2_{change}
Model 1					.75	.56	.56**
ZTPI	-.03	-.47	.64	.00			
Age	-.13	-2.13	.04*	.01			
Negative Affect	.67	11.80	.00**	.42			
Model 2					.75	.56	.01
ZTPI	-.02	-.27	.79	.00			
Age	-.12	-1.84	.07	.01			
Negative Affect	.66	10.16	.00**	.31			
Future Frequency	.03	.44	.66	.00			
Future Clarity	-.07	-1.10	.27	.00			
Model 3					.76	.58	.02*
ZTPI	-.02	-.34	.74	.00			
Age	-.12	-2.01	.05*	.01			
Negative Affect	.64	9.89	.00**	.29			
Future Frequency	.02	.30	.76	.00			
Future Clarity	-.06	-1.01	.32	.00			
FFxFC	-.13	-2.39	.018*	.02			

Note. ZTPI = Zimbardo's Time Perspective Inventory, FFxFC = Interaction Term.
*$p < .05$. **$p < .01$.

In the final model, negative affect (28.6%, $p < .001$) explained the most variance in anxiety with age explaining 1% ($p = .047$) and the interaction term explaining 2% ($p = .018$). After step three, with all the variables accounted for in the model, the accumulative proportion of variance explained in anxiety was 57.8% (adjusted 56%).

In sum, future clarity significantly moderated the negative relationship between future frequency and anxiety, but the moderation effect was weak. As mentioned above, future clarity had no statistically significant moderation effect on depression and stress.

The significant interaction effect for future clarity and future frequency in the prediction of anxiety was further explored by testing the conditional effects of future clarity at two levels of future frequency; one standard deviation above and below the mean (see Figure 1).

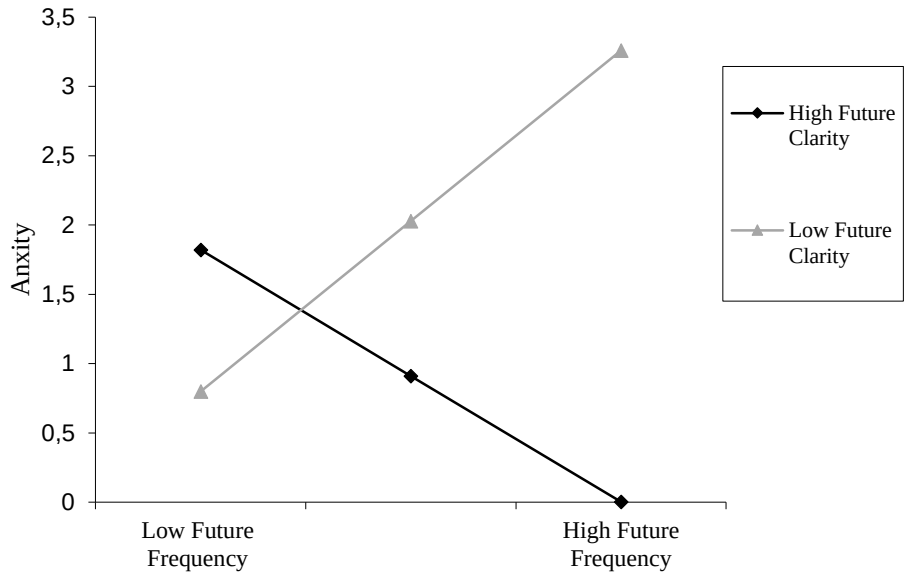

Figure. 1. Interaction between future clarity and future frequency in predicting anxiety (high and low values for future clarity correspond to values one standard deviation above and below the mean respectively).

At low levels of future frequency, low future clarity is associated with lower anxiety, while high future clarity is associated with higher anxiety. The effects of low and high future clarity converge at low levels of future frequency. When future frequency is high, low future clarity is associated with higher anxiety, while high future clarity is associated with lower anxiety – this is partially consistent with the hypothesis. Therefore, H2 was partially supported. H2(a) was supported as anxiety was highest at high levels of future frequency and low levels of future clarity. However, there was no support for H2(b) as anxiety levels were lowest when future clarity *and* future frequency were highest.

Discussion

This study investigated the effects of potential interactions between future clarity and future frequency on mental health. Specifically, this study examined whether future clarity

moderates the negative impact of future frequency on three aspects of mental health: depression, anxiety, and stress. The results demonstrated support for a relationship with anxiety (H2) but not depression (H1) or stress (H3).

H2 (anxiety would be (a) highest for individuals with high levels of future frequency and low levels of future clarity *and* (b) lowest for individuals with low levels of future frequency and high levels of future clarity) was supported, as future clarity significantly moderated the negative effect of future frequency on anxiety (i.e., when frequently thinking about the future-self; higher levels of clarity were a greater protective factor for anxiety). This effect was not evident at low levels of future frequency as lower clarity produced less anxiety compared to higher clarity. Demonstrating a clear and vivid future-self construal may only be a protective factor against the anxiety associated with frequently thinking about that future-self when that image is constantly presented or ruminated. Also, an unclear and hazy future-self-image might cause less anxiety than a clearer future-self-image when an individual does not think about it often.

H1 and H3 (depression and stress would be (a) highest for individuals with high levels of future frequency and low levels of future clarity *and* (b) lowest for individuals with low levels of future frequency and high levels of future clarity) were largely unsupported as future clarity was unable to significantly moderate the negative effects future frequency had on depression or stress. There was therefore no evidence that having a clear and vivid image of oneself in the future can help protect against the depressive and stressful effects evoked by frequently thinking about that future-self-image.

The support found for H2 could be explained by temporal distance. Temporal distance interacts with future clarity and future frequency and affects anxiety. When the future-self appears closer in temporal distance, thoughts about this future-self occur more frequently to encourage and motivate goal setting and action planning (D'Argembeau et al., 2011). By frequently thinking about near-future events, self-guidance dialogue increases, which aids in the action planning process (D'Argembeau et al., 2011). This could explain future frequency's maladaptive effects on anxiety, as an increase in the number of goals set, coupled with a recurrence of thoughts about how to attain them, is associated with greater anxiety (Dickson et al., 2017).

Future clarity might moderate the negative effects of future frequency as individuals feel more connected to a future-self that is clear and vivid (Blouin-Hudon & Pychyl, 2015). A clear future-self manifests as an extension of the present self and therefore appears more achievable (Blouin-Hudon & Pychyl, 2015). Where both future clarity and future frequency

are high, future frequency helps bolster this notion of achievability by constantly reminding the individual of what they must do to achieve the future-self. Where future clarity is low, an individual may delay proactive goal setting and action planning in favour of the future-self taking on these tasks at a later stage, which has been associated with increased levels of anxiety (Blouin-Hudon & Pychyl, 2015). When both future clarity and future frequency are low the level of connectedness, motivation and self-guidance dialogue decreases reducing the anxiety associated with achieving the future-self. Additionally, this subsequent positive effect on anxiety might be missing when future frequency is reduced. Applying this reasoning, it is likely future clarity changes the quality of a future-self-image, while future frequency only (unhelpfully) repeats that image.

H1 and H3 were unsupported as there were no significant interaction effects for depression or stress. This suggests the clarity of one's future-self does not provide protection from the negative effects repetitively thinking about the future-self has on depression or stress. However, when the present study's moderation analysis was conducted without negative affect as a co-variate, future clarity was a significant moderator for depression and stress. This raises questions about whether future clarity's unique variance (above and beyond affect) could have been detected for depression and stress, with the current sample or power level.

Additionally, considering depression, anxiety and stress share many similarities and are likely exposed to some degree of multicollinearity, these results are somewhat unexpected. Measurement error could offer an explanation. The DASS-21 is a universally utilised and validated tool, but there is contention about the representativeness of the DASS-21's dimensions (i.e., depression, anxiety and stress) and their level of shared variance with affect (Brown et al., 1997; Szabó, 2010). Specifically, there is resounding criticism about whether the DASS-21 accurately and independently measures depression, anxiety, and stress. Brown et al. (1997) posits that the DASS-21 subscales measure depression, anxiety, and stress under a tripartite model where depression equates to low positive affect, anxiety equates to physiological hyperarousal and stress equates to negative affect. Although all three constructs have been validated and assessed to represent specific aspects of each construct, both depression and stress closely correlate with affect, whereas anxiety does not (Brown et al., 1997; Osman et al., 2012; Szabó, 2010). The DASS-21 is not used as a diagnostic tool rather a holistic device which measures dimensional components of anxiety and depressive disorders (Osman et al., 2012). Therefore, independently examining each dimension, combined with likelihood of shared variance for affect among stress and depression may have mitigated our ability to interpret these results more fully.

The different results for anxiety and depression, specifically, are somewhat unexpected as they often appear co-morbidly with similar symptomology (Groen et al., 2020; Shaw et al., 2017). Research suggests there is a difference in the content between the ruminations associated with depression, anxiety, and future frequency. For example, research has associated an increase of future frequency with ruminative maladaptive cognitions relating to habitual self-thoughts whereas the rumination in depression is often associated with 'depressive' ruminations, which are repetitive thoughts about the possible causes and implications of one's depressed feelings (Raes, 2010) and are associated with negative valence (Nolen-Hoeksema et al., 2008). Conversely, the rumination associated with anxiety is closer to 'worry;' a chain of uncontrollable negative affect-laden thoughts constructed to engage in mental problem-solving issues with several possible negative outcomes (Borkovec et al., 1983). This type of rumination might be closer to the type of self-rumination that is associated with future clarity (e.g., the consideration of future consequences), noting future-self rumination is generally associated with negative possible future selves and therefore alike the rumination of worry and problem-solving (McElwee & Haugh, 2010). This could explain the current study's findings and support an inference that the types of thoughts that influence anxiety and depression differ. Further research should investigate more closely the type of rumination associated with future clarity and each construct of mental health.

Limitations and future research suggestions

There are several limitations which may impact the ability to interpret these results more comprehensively. Firstly, reporting on phenomena that require individuals to reflect and possibly simultaneously construct their future-selves is a psychologically complex task, which may not have been sufficiently captured by self-reports. As previously mentioned, the quality of these thoughts might be an important aspect that requires further investigation. Future research should investigate the characteristics of future-self-thoughts through a qualitative framework. This might shed light on the effects that different qualities of future-self-thoughts have on mental health. Secondly, higher anxiety may in fact cause an increase in future frequency, and consequently an increase in future clarity may moderate the negative effects of future frequency on anxiety, reversing the direction of the causation. Relatedly, low future clarity could lead to increasing levels of future frequency and consequently, anxiety. Further research could test the direction of the relationship by manipulating these variables to justify conclusions more accurately about casual direction and moderation. Having a more accurate causal effect would help construct a treatment that targets the correct variable responsible for influencing mental health. Lastly, the cohort used

in this study is not representative of the public. Participants on average scored 'mild' for all mental health measures. University students tend to be constantly thinking about their uncertain post-study futures and therefore differ compared to 'the average' individual. Additionally, the present cohort of university students were, on average, younger adults and therefore likely to envision the future differently compared to older adults (McElwee and Haugh, 2010). This may have yielded levels of frequency, clarity, mental health and resulting interactions that affected the applicability of this study to the wider population.

Conclusion

This paper aimed to investigate the relationship between future frequency, future clarity with three measures of emotional disturbance/mental health: depression, anxiety and stress. Specifically, it investigated whether the protective effects on the mental health associated with future clarity could moderate the negative effects on the mental health associated with future frequency. Overall, the findings of this study were mixed, finding a significant moderation effect for anxiety but no significant moderation effect for depression or stress. An important conclusion from this study is the observation about the complexity of thoughts about the self in the future. The type of future image one constructs and how it effects mental health might go beyond the constructs of its clarity or frequency. As future clarity did protect some aspects of mental health, further research is warranted. Future research should investigate the qualities of clear and frequent thoughts, as a clear and negatively perceived future-self would likely have differing effects on mental health than a clear and positively perceived future-self. This could have important implications for how psychologists work with those experiencing issues related to such outcomes like career or life directions. Future research should also utilise a combination of different measures (both qualitative and quantitative) and manipulate variables (e.g., future clarity, future frequency) to further document future-self features. Furthering the knowledge of future-thought and its interaction with mental health could help develop new mental health treatment protocols. Importantly, researching future-thought might help the development of non-invasive, cost-effective cognitive treatments for depression, anxiety, and stress, which are the most prevalent mental health disorders globally.

Funding/Financial Support

The authors have no funding to report

Other Support/Acknowledgement

The authors have no support to report.

Competing Interests

The authors have declared that no competing interests exist.

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