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Positive mental imagery and mental health amongst university students in Pakistan

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Mental health problems amongst university students pose a major public health challenge, and this is particularly the case in Pakistan. Alongside broader societal and cultural pressures, cognitive factors likely also play a role in the development of and resilience to mental health problems and may provide a feasible target for interventions. The current study built on previous research in primarily European samples investigating the relationship between one cognitive factor, positive future-oriented mental imagery, and mental health, extending this to a sample of university students in Pakistan ($N = 1838$). In a cross-sectional design, higher vividness of positive future-oriented mental imagery was associated with lower levels of depressive symptoms and higher levels of positive mental health amongst participants completing questionnaire measures on paper ($N = 1430$) or online ($N = 408$). In the sample completing the measures on paper, these relationships remained statistically significant even when controlling for socio-demographic and mental health-related variables. The results provide a foundation for further investigating positive mental imagery as a potential mechanism of mental health and intervention target amongst university students in Pakistan.

Keywords: Mental imagery; Depressive symptoms; Students; Positive mental health; Pakistan.

There is growing evidence that there is a high prevalence of mental health problems amongst Pakistani university students (Saleem et al., 2013). A number of different factors such as academic stress, political instability and financial constraints make these students a particularly vulnerable group for developing mental health issues. Recent research has highlighted the scale of this problem via cross-cultural comparison studies. For example, Pakistani students have higher depressive symptoms, stress and anxiety (Bibi, Lin, Zhang, & Margraf, 2020) compared to German students. Further, in comparison to German and Chinese students Pakistani students report a higher level of symptoms of mental disorders, a higher incidence of bullying in the workplace, and higher levels of suicidality but are less likely to have received appropriate treatment (Bibi et al., 2019).

It has been increasingly recognised that a complete understanding of mental health needs to include not only consideration of the presence or absence of mental disorders or negative life experiences, but also the extent to which people experience mental wellbeing and satisfaction with their life (e.g., Keyes, 2005; Lukat et al., 2016). This latter aspect, which can be termed "positive mental health" is characterised by general psychological, emotional, and social wellbeing (Keyes, 2002). While positive mental health and mental health problems are interconnected, for example, with measures of positive mental health correlating negatively with measures of depressive symptoms, anxiety, and stress (e.g., Lukat et al., 2016), they do not represent two opposite ends of a continuum but rather two independent, if correlated, concepts (e.g., Keyes, 2007). In fact, longitudinal data has suggested positive mental health may be a better predictor of recovery from mental disorders than "negative" measures of psychopathology (e.g., Trumpf et al., 2009; Teismann et al., 2018). Importantly, research has found that

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Pakistani students report not only higher levels of symptoms of mental disorders, but also lower levels of positive mental health than German students, as well as lower levels of life satisfaction and social support (Bibi, Lin, & Margraf, 2020).

In this context it can be useful to identify cognitive factors that may be protective for mental health, as these may provide a useful target for preventive interventions; although what may ultimately be needed are societal changes, more effective mental health policies and better treatment provision, in the meantime simple interventions that can provide relief in the less distant future could be hugely valuable. One potentially relevant cognitive factor relates to the experience of mental imagery, in particular positive mental imagery of possible future events. Simulation of possible positive future events via mental imagery is thought to play an important functional role in daily functioning, for example, in planning, decision-making, and motivating goal-directed behaviour (e.g., Schacter et al., 2008; Szpunar et al., 2014). Individual differences in the experience of future-oriented mental imagery have been associated both with depressive symptoms and with positive aspects of mental health. For example, people experiencing depressive symptoms tend to generate less vivid positive future mental imagery than non-depressed individuals (Holmes et al., 2016), whereas higher levels of optimism have been associated with more vivid positive future mental imagery (Blackwell et al., 2013; Ji et al., 2017). Although a causal role for mental imagery vividness in mental health has not yet been demonstrated, this seems a plausible hypothesis. For example, if someone can only dimly imagine positive events yet very vividly imagine negative events when they think about the future, this could make them feel less optimistic, more pessimistic, more hopeless, and more anxious. Positive mental imagery may also provide a suitable target for low-intensity interventions amongst Pakistani students, with one pilot study suggesting promise for a computerised positive mental imagery intervention in increasing positive mental imagery vividness and reducing depressive symptoms (Bibi, Margraf, & Blackwell, 2020).

The present research therefore aimed to build on the previous lines of work investigating the relationship between positive prospective mental imagery and mental health, which has focused on its relevance for depressive symptoms and optimism. In particular, it aimed to extend results found in previous primarily European samples to a Pakistani student sample. While there was no a priori reason not to expect similar associations within a Pakistani sample, cross-cultural transferability of such findings cannot be assumed, particularly given limited cross-cultural research on mental imagery within clinical psychology (Blackwell, 2021). We made use of a cross-sectional dataset from 1841 university students in Pakistan that had been collected to investigate a number of different aspects of mental health and wellbeing (Bibi, Lin, Zhang, & Margraf, 2020). In addition to the measures included to address the study's primary research questions (see e.g., Bibi et al., 2019; Bibi, Lin, & Margraf, 2020; Bibi, Lin, Zhang, & Margraf, 2020), within this dataset there was also a measure of prospective mental imagery that had been included to allow examination of the relationships previously found between prospective imagery and mental health within this new sample. Extending the previous work in this area, we aimed to investigate the relationship between positive mental imagery and both depressive symptoms (e.g., Holmes et al., 2016) and positive mental health[1] (e.g.Blackwell et al., 2013; Ji et al., 2017), hypothesising that more vivid positive prospective mental imagery would be associated with lower levels of depressive symptoms and more positive mental health, including when controlling for additional potential confounding variables, such as demographic factors and general health status, symptoms of anxiety, and vividness of negative mental imagery. These additional variables were chosen to follow those included in the analyses of previous studies (Blackwell et al., 2013; Ji et al., 2017) as closely as possible, and as factors that we would expect to covary with and potentially contribute to variations in levels of depression and positive mental health.

METHOD

Participants

Data for the current study were collected within the Bochum Optimism and Mental Health study programme (BOOM; e.g., Maercker et al., 2015; Velten et al., 2014), intended to explore protective factors for positive and negative mental health. University students in Pakistan were recruited from different universities of Pakistan through online and offline sources (see Bibi, Lin, & Margraf, 2020; Bibi, Lin, Zhang, & Margraf, 2020). Participants were required to be a student aged 18–50 and fluent in English. Ethical approval was provided by the ethics committee for the Faculty of Psychology, Ruhr University Bochum, Germany. All participants provided informed consent on paper or online. Two thousand university students agreed to participate in the current research, but 159 participants did not complete the questionnaires and were excluded from analyses. After excluding 3 participants who did not complete the PIT (prospective imagery test), a total sample of

[1]We originally planned to use the Life Orientation Test-Revised (Schacter et al., 2008), a measure of optimism, as our positive mental health-related variable, as per Blackwell et al. (2013) and Ji et al. (2017), but the internal consistency in our sample was low (Cronbach's alpha = .43 online, .55 offline), and hence we did not analyse it and examined a positive mental health scale instead.

1838 participants (gender: 59.6% female, 40.4% male, $M_{age} = 22.84$, $SD_{age} = 3.01$) completed the entire battery of self-reported questionnaires ($N = 408$ online, $N = 1430$ on paper). Participants completing measures online did so in their own time from home, whereas those completing them on paper ("offline") did so in group sessions in the university. All measures were completed in English, which is the official language used at Pakistani universities.

Measures

Of the measures described here, only the prospective mental imagery test was specifically included in the study for the purpose of the analyses described here, whereas the others were included as part of the aims of the broader project from which these data were drawn (Bibi, Lin, Zhang, & Margraf, 2020).

Prospective imagery test (Holmes et al., 2008; Stöber, 2000)

The PIT is brief self-administered inventory used to measure the vividness of prospective mental imagery vividness. It consists of 10 positive (e.g., "*People you meet will like you*") and 10 negative ("*You will be the victim of crime*") description of hypothetical future scenarios. Participants were instructed to imagine each scenario as if happening to them in near future, then rate the vividness of their image on a 5-point scale ranging from 1 (*no image at all*) to 5 (*very vivid*). The PIT was given with the same instructions as previous studies (Blackwell et al., 2013; Ji et al., 2017), in that participants were to rate the vividness of their image "When you have a mental image of the scenario happening to you" and there was no time limit applied. Previous studies have found the PIT to have good internal consistency (e.g., $.83 < \alpha < .90$; Blackwell et al., 2013). In our sample of university students, for those completing the questionnaires online, Cronbach's alpha was $\alpha = .87$ for positive mental imagery vividness and $\alpha = .77$ for negative mental imagery vividness. For participants completing the measures on paper, Cronbach's alpha was $\alpha = .73$ for positive mental imagery vividness and $\alpha = .69$ for negative mental imagery vividness. As in previous studies investigating positive prospective mental imagery (e.g., Blackwell et al., 2013; Ji et al., 2017) we were primarily interested in the positive scale, but inclusion of the negative scale allowed us to control for vividness of negative prospective mental imagery. This allowed us to check that any relationships found with the positive vividness score were specific to prospective imagery that was positive in valence, rather than simply reflecting relationships with vividness of emotional prospective mental imagery in general (regardless of valence).

Depression anxiety stress scales (short form: DASS-21; Henry & Crawford, 2005)

The DASS-21 was used to measure participants' depressive symptoms, anxiety and stress, with each of these three areas represented by a 7-item subscale. Participants rated how often during the past week they had experienced the symptoms listed on a scale ranging from 0 (*never*) to 3 (*almost always*). The score for each subscale is the sum of the relevant items. Cronbach's alphas in our sample were as follows: In our online sample, depressive symptoms: $\alpha = .82$, anxiety: $\alpha = .72$, stress: $\alpha = .75$. In our offline sample, depressive symptoms: $\alpha = .77$, anxiety: $\alpha = .72$, stress: $\alpha = .74$. For the purpose of the hypotheses tested in this paper, we were primarily interested in the depressive symptoms, following on from previous research investigating the relationship between positive prospective mental imagery and depressive symptoms (see Holmes et al., 2016). Inclusion of the anxiety scale in our analyses further allowed us to test the extent to which any relationships found between depressive symptoms and positive prospective mental imagery vividness were specific to depressive symptoms rather than reflecting other aspects of psychopathology such as anxiety. As we did not have any particular hypotheses about stress and it was not assessed in the studies we built upon (Blackwell et al., 2013; Ji et al., 2017) we did not include it in these analyses.

Positive mental health (PMH; Lukat et al., 2016)

The 9-item PMH scale was used as a measure of "positive mental health," that is, general mental wellbeing. The PMH was designed as a unidimensional measure of positive mental health, and includes items such as "All in all, I am satisfied with my life," "I manage well to fulfill my needs" and "I am often carefree and in good spirits," which participants rate on a 4-point scale ranging from 0 (*do not agree*) to 3 (*agree*). In our online sample, $\alpha = .86$, and in our offline sample, $\alpha = .87$. Inclusion of the PMH as a dependent variable in analyses allowed us to test the relationship between positive mental imagery and a measure of positive mental wellbeing. Inclusion as an independent variable alongside the PIT allowed us to better test whether any relationship between positive prospective mental imagery vividness and depressive symptoms was due to the requirement to generate mental imagery on the PIT, rather than a more general positive bias in outlook or responding.

Health scale (EQ5D; Kind, 1996)

Participants' perceived general health status of was measured using the EuroQol-5D-3L visual analogue scale (VAS). Participants responded on a VAS, with scores

ranging from "Best imaginable health state" (100) and "Worst imaginable health state" (0). The EQ5D was included to allow us to control for general (physical) health, as in the analyses by Blackwell et al. (2013) and Ji et al. (2017).

Data analysis

Prior to our main data analysis, we checked whether we could combine the data collected online and offline for our analyses. To do so we tested measurement invariance using Multi-group Confirmatory Factor Analysis (Byrne, 2016) of the main measures we planned to analyses. For the PIT we could only establish configural measurement invariance (see Supporting Information), which suggested that we could not combine offline and online data together. There was also a statistically significant difference in Cronbach's alpha for the two samples for both positive items ($\chi^2(1) = 78.28$, $p < .001$) and negative items ($\chi^2(1) = 12.23$, $p < .001$), with lower internal consistency in the offline sample. We therefore analysed the offline and online data separately.[2]

To examine the relationship between positive mental imagery vividness and both depressive symptoms and positive mental health, we conducted two separate hierarchical linear regressions, one with scores on the depressive symptoms subscale of the DASS-21 as the dependent variable, and one with scores on the PMH as the dependent variable. Our main independent variable, vividness ratings for positive items on PIT, was entered in a first step. Other independent variables were then added in a series of further steps to see which, if any, rendered the relationship between positive PIT scores and the dependent variable no longer statistically significant (as per Ji et al., 2017). Sociodemographic variables were added in the second step, followed by negative PIT scores in a third step (to control for future mental imagery vividness more general), anxiety in a fourth step, and our measure of "positive mental health" in a fifth and final step (when this was not the dependent variable).

The analyses and these steps were not pre-registered, but we aimed to follow the same logic as Ji et al. (2017), starting with more general measures and then gradually introducing the measures that reflected increasingly stringent tests of specificity. In the initial steps we tried to use the same variables as Ji et al. (2017) as far as possible, providing a form of replication, albeit within the constraints of which measures had been collected as part of the BOOM study, and the nature of the sample (which meant that some demographic variables were too limited in variability to be meaningfully included). The final step when depression was the dependent variable, in which we introduced the measure of positive mental health, allowed us to check whether the relationship between positive mental imagery vividness and depression was not simply due to the PIT measuring something positive or protective (in contrast to the largely "negative" mental health and risk factor measures previously included), but potentially specific to the PIT itself (e.g., as a measure of something more specifically about mental imagery).

Analyses were conducted in SPSS version 24, with the exception of the measurement invariance analysis, which was conducted in RStudio version (1.1.463).

RESULTS

Descriptive statistics and zero-order correlations

Tables 1 and 2 show descriptive characteristic for the offline and online sample and zero order correlation with positive items of PIT.

Regressions with depressive symptoms and positive mental health as dependent variables

Five-step linear regressions were used to investigate the relationship between positive prospective mental imagery vividness and both depressive symptoms and positive mental health.

Results are described in Table 2 (offline) and Table 3 (online). In the offline sample, scores on positive items of the PIT remained a significant predictor of scores on the DASS-21 depressive symptoms scale even when controlling for all other confounding variables. Notably, although scores on the PIT explained only a small proportion of variance in DASS-21 depressive symptoms scores, in the final regression they were the strongest predictor (i.e., largest β value) apart from scores on the DASS-21 anxiety subscale. In the online sample, inclusion of negative mental imagery vividness on the PIT rendered the relationship between positive PIT scores and DASS-21 depressive symptoms scores no longer statistically significant.

When scores on the PMH were the dependent variable, in both the online and offline sample scores on positive items of the PIT were significant predictors of PMH scores even when including all other variables, and in the offline sample they were in fact the strongest predictor (largest β value) in the final regression.

[2]We note that if we had not checked this and simply combined the two samples the results would mirror those of the larger offline sample (see Supporting Information for details).

TABLE 1
Descriptive statistics, and zero-order correlations of PIT positive mental imagery vividness with other study variables in the offline and online samples

	Offline data (N = 1430)		*Online data (N = 408)*	
Variable	*M (SD) or N (%)*	r_0	*M* (SD) *or N (%)*	r_0
PIT positive vividness	35.19 (6.39)		32.04 (8.71)	
PMH	17.53 (6.52)	.37***	17.04 (5.59)	22***
Socio-demographic variables				
Age (years)	22.59 (2.41)	.07*	23.71 (4.40)	−.08
Gender, *N* (%)		.09**		.07
Male	598 (41.8)		144 (35.3)	
Female	832 (58.2)		264 (64.7)	
Education, *N* (%)		−.01		.04
Bachelor	1351 (94.5)		396 (97.1)	
Master or above	79 (5.5)		12 (2.9)	
EQ−5D	68.08 (30.65)	.18***	62.33 (26.44)	.10*
PIT negative vividness	29.16 (6.47)	.10***	27.45 (7.29)	−.18***
DASS-21				
Depressive symptoms	7.79 (4.35)	−.15***	7.60 (4.38)	−.16***
Anxiety	8.52 (4.23)	−.06*	7.94 (3.91)	−.07

Note: r_0 = zero order correlations with prospective imagery test (PIT) positive imagery vividness = imagery vividness ratings for positive items on the PIT. PMH = positive mental health; EQ-5D = Euroqol-5D-3L (self-rated health from "Worst imaginable health state", scored as 0, to "Best imaginable health state", scored as 100); PIT negative imagery vividness = imagery vividness ratings for negative items on the PIT. For gender and education level, positive correlations indicate higher PIT positive scores for women and people with higher education levels, respectively. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

TABLE 2
Regression analysis of depressive symptoms and positive mental health (dependent variable) and positive prospective mental imagery vividness (independent variable) in the offline sample ($N = 1430$)

Independent variable	*Model 1 β*	*Model 2 β*	*Model 3 β*	*Model 4 β*	*Model 5 β*
Dependent variable: depressive symptoms					
PIT positive vividness	−.152***	−.155***	−.186***	−.123***	−.101***
Gender (female)		.068**	.089***	.038*	.037
Age (years)		.083**	.106***	.049***	.051***
EQ−5D		−.045	−.023	−.020	−.010
PIT negative vividness			.242***	.084***	.076***
Anxiety				.685***	.686***
PMH					−.062***
R^2	.023	.038	.094	.534	.537
Adjusted R^2	.022	.035	.091	.532	.534
ΔR^2 change	.023	.015	.057	.439	.003
F for ΔR^2	33.56***	7.18***	88.88***	1340.73***	9.73***
F for model	33.56***	13.89***	29.57***	271.282***	235.34***
Dependent variable: positive mental health					
PIT positive vividness	.366***	.333***	.348***	.349***	.336***
Gender (female)		−.010	−.020	−.021	−.017
Age (years)		.042	.031	.030	.035
EQ−5D		.179***	.168***	.168***	.166***
PIT negative vividness			−.119***	−.122***	−.113***
Anxiety				.012	.087**
Depressive symptoms					−.109***
R^2	.134	.167	.181	.181	.187
Adjusted R^2	.134	.165	.178	.178	.183
$\Delta R^{2\text{change}}$	.134	.033	.014	.000	.006
F for ΔR^2	221.40***	18.96***	23.73***	.233**	9.73***
F for model	221.40***	71.66***	62.99***	52.50***	46.67***

Note: Prospective imagery test (PIT) positive imagery vividness = mental imagery vividness ratings for positive items on the PIT; PMH = positive mental health; EQ-5D = Euroqol-5D-3L (self-rated health from "Worst imaginable health state", scored as 0, to "Best imaginable health state", scored as 100); PIT negative imagery vividness = mental imagery vividness ratings for negative items on the PIT. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

TABLE 3
Regression analysis of depressive symptoms and positive mental health (dependent variable) and positive prospective mental imagery vividness (independent variable) in online sample ($N = 408$)

Independent variable	*Model 1 β*	*Model 2 β*	*Model 3 β*	*Model 4 β*	*Model 5 β*
Dependent variable: depressive symptoms					
PIT positive vividness	−.163***	−.110*	−.064	−.071	−.042
Gender (female)		−.098*	−.085	−.039	−.049
Age (years)		.173***	.181***	.135***	.114***
EQ−5D		−.312***	−.288***	−.150***	−.117***
PIT negative vividness			.272***	.082*	.089*
Anxiety				.655***	.624***
PMH					−.156***
R^2	.027	.173	.244	.606	.626
Adjusted R^2	.024	.165	.235	.600	.620
ΔR^2 change	.027	.147	.071	.362	.020
F for ΔR^2	11.06***	23.86***	37.68***	368.55***	21.68***
F for model	11.06***	21.12***	25.97***	102.86***	95.81***
Dependent variable: positive mental health					
PIT positive vividness	.223***	.189***	.187***	.190***	.166***
Gender (female)		−.049	−.050	−.063	−.076
Age (years)		−.143**	−.144**	−.130**	−.086
EQ−5D		.253***	.252***	.211	.161***
PIT negative vividness			−.009	.048	.075
Anxiety				−.195***	.021
Depressive symptoms					−.329***
R^2	.050	.139	.139	.171	.214
Adjusted R^2	.047	.130	.128	.159	.200
$\Delta R^{2\text{change}}$	.050	.089	.000	.032	.043
F for ΔR^2	21.27***	13.93***	.032***	15.49***	21.68***
F for model	21.27***	16.27***	12.99***	13.80***	15.53.***

Note: Prospective imagery test (PIT) positive imagery vividness = mental imagery vividness ratings for positive items on the PIT. PMH = positive mental health; EQ-5D = Euroqol-5D-3L (self-rated health from "Worst imaginable health state", scored as 0, to "Best imaginable health state", scored as 100); PIT negative imagery vividness = mental imagery vividness ratings for negative items on the PIT. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

DISCUSSION

This study investigated the relationship between positive prospective mental imagery vividness and both depressive symptoms and positive mental health in a sample of university students in Pakistan. Results from a sample completing the measures pen-and-paper ("offline," $N = 1430$) and another completing the measures online ($N = 408$) showed a statistically significant negative association between positive mental imagery vividness and depressive symptoms, and a positive association between mental imagery vividness and positive mental health. In the pen-and-paper sample, these relationships remained statistically significant when controlling for a wide range of other variables including demographics, negative imagery and anxiety. These results extend those found in previous populations to a Pakistani sample and highlight the potential utility of investigating positive mental imagery as a mechanism in both negative and positive aspects of mental health.

The results in the larger pen-and-paper sample echo previous studies that have suggested very specific relationships between positive prospective mental imagery vividness and measures of mental health (e.g., Blackwell et al., 2013; Ji et al., 2017). That is, these relationships do not appear to simply be due to shared variance with other mental health-related measures, and this strengthens the suggestion that there is something specific about the mental imagery aspect of what is measured by the Prospective mental Imagery Test. It is however not possible to draw definitive conclusions as to why we did not find such strong unique associations within the online sample, for example, whether this was due to differences in the samples themselves or related to the method of completing the questionnaires. Given the lack of measurement invariance on the PIT between the two samples there does appear to be differences in how the participants responded on this measure. It is possible that within the online version participants were more likely to click similar responses for similarly-valenced items (particularly as the questionnaire came at the end of a long online survey), which would be consistent with the higher internal consistency in the online sample and the negative correlation between the positive and negative subscales. This in turn would lead to the PIT being a less "true" measure of mental imagery vividness. However, this is purely speculative.

There are a number of different ways to interpret the finding from this study that more vivid positive prospective mental imagery was associated with higher levels of positive mental health and lower levels of depressive symptoms. Simulation of possible future events via the generation of mental imagery is thought to play an important role in thinking about the future and motivating goal-directed behaviour (e.g., Blackwell, 2021; Schacter et al., 2008; Szpunar et al., 2014). If when someone thinks about the future, they struggle to vividly imagine positive events happening in their life, they could evaluate such events as unlikely to occur, fuelling hopelessness and pessimism (Holmes et al., 2016; Ji et al., 2017). Further, if when someone tries to evaluate the potential outcome of a course of action, they struggle to imagine positive possibilities this may reduce their expectation of potential reward and thus reduce motivation to engage in goal-directed activity (e.g., Renner et al., 2017). Hence, reduced vividness of positive prospective mental imagery could conceivably maintain or exacerbate depressive symptoms. Conversely, if when someone thinks about future events of outcomes, they can vividly imagine positive possibilities this could lead to increased optimism (Blackwell et al., 2013) motivation to engage in goal-directed behaviour (e.g., Renner et al., 2019), and generally higher levels of positive emotional response (Wilson et al., 2018). Thus, increased vividness of positive prospective mental imagery could contribute to higher levels of positive mental health (Blackwell et al., 2018). This perspective posits a causal role for vividness of positive prospective mental imagery; from another perspective, vividness of positive prospective mental imagery could reflect accessibility of positive material (e.g., positive affect-laden episodes) in memory, which in turn may be modulated by current levels of depressive symptoms or positive mental health. That is, when someone is experiencing higher levels of depressive symptoms, they may find it harder to retrieve the positive episodic material from memory necessary to generate positive future-oriented mental imagery. From this perspective, vividness of positive prospective mental imagery may simply be a reflection of an individual's current mental health and potentially plays no causal role.

The results from this study cannot in themselves provide evidence for these alternative perspectives, for example, whether prospective mental imagery plays a causal role in depressive symptoms or positive mental health amongst Pakistani university students but provide a firmer foundation for investigating the possibility of such causal relationships via experimental or interventional studies. In fact, one study has investigated a computerised positive mental imagery intervention amongst university students in Pakistan experiencing elevated symptoms of depression, with promising results (Bibi, Margraf, & Blackwell, 2020). However, this was only a small pilot study and therefore in need of replication. Further, although this study and several previous ones have investigated the relationship between vividness of deliberately generated positive mental imagery and mental health measures, it is not clear that increasing this vividness is necessarily the best target for mental imagery interventions. For example, it could be that the relevant aspect of scores on the PIT reflect accessibility of positive episodic memory content and the ease with which this can be projected into the future, and it is this accessibility rather than vividness per se that should be the target of interventions. From this perspective a wider range of autobiographical memory-focused interventions (e.g., Hitchcock et al., 2017) may be helpful. The prevalence of mental health difficulties amongst these students indicates a need for broader structural changes, but if simple and easily accessible interventions were available this would be helpful for those students currently experiencing depressive symptoms.

While the large sample size in the current study and the possibility to collect data via two different methods are strengths, the study has a number of limitations. First, although university students in themselves are an important sample to study the findings cannot necessarily be generalised to clinical or older populations in Pakistan. Second, which measures we were able to include in our regressions was determined by those included in the broader BOOM study from which this data came, and therefore not selected based on theoretical considerations of which measures would be most useful to investigate mental imagery specifically. Third, internal consistency for the PIT was at the lower limits of acceptability. This did not appear to be a consequence of any individual problematic items but rather generally low correlations between the items. In this study the main effect would be to reduce statistical power to find relationships between the PIT and other measures, but it also suggests that the PIT may need further optimization for a Pakistani student sample. Finally, these analyses were not pre-registered and as such are best considered exploratory rather than confirmatory.

In summary, this research highlights positive future-oriented mental imagery as an important mechanism to investigate in relation to both positive and negative aspects of mental health and thus a useful target for future research. Further, it extends previous research to a new sample and culture, university students in Pakistan, providing a basis for future research investigating mental imagery as a mechanism in mental health and interventions in a population in great need of interventions.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study received ethical approval from the ethics committee for the Faculty of Psychology,

Ruhr-Universität-Bochum, Germany (ref: 315). All participants provided written consent.

DATA AVAILABILITY STATEMENT

The datasets generated and analysed during the current study are available via the Open Science Framework, https://osf.io/9hbmk/. Materials are available from the corresponding author on request.

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REFERENCES

Bibi, A., Blackwell, S. E., & Margraf, J. (2019). Mental health, suicidal ideation, and experience of bullying among university students in Pakistan. *Journal of Health Psychology*, *26*(8), 1185–1196.

Bibi, A., Lin, M., & Margraf, J. (2020). Salutogenic constructs across Pakistan and Germany: A cross sectional study. *International Journal of Clinical and Health Psychology*, *20*(1), 1–9.

Bibi, A., Lin, M., Zhang, X. C., & Margraf, J. (2020). Psychometric properties and measurement invariance of Depression, Anxiety and Stress Scales (DASS-21) across cultures. *International Journal of Psychology*, *55*, 916–925.

Bibi, A., Margraf, J., & Blackwell, S. E. (2020). Positive imagery cognitive bias modification for symptoms of depression among university students in Pakistan: A pilot study. *Journal of Experimental Psychopathology*, *11*(2). https://doi.org/10.1177/2043808720918030

Blackwell, S. E. (2021). Mental imagery in the science and practice of cognitive behaviour therapy: Past, present, and future perspectives. *International Journal of Cognitive Therapy*, *14*(1), 160–181.

Blackwell, S. E., Rius-Ottenheim, N., Schulte-van Maaren, Y. W., Carlier, I. V., Middelkoop, V. D., Zitman, F. G., Spinhoven, P., Holmes, E. A., & Giltay, E. J. (2013). Optimism and mental imagery: A possible cognitive marker to promote well-being? *Psychiatry Research*, *206*(1), 56–61.

Blackwell, S. E., Westermann, K., Woud, M. L., Cwik, J. C., Neher, T., Graz, C., Nyhuis, P. W., & Margraf, J. (2018). Computerized positive mental imagery training versus cognitive control training versus treatment as usual in inpatient mental health settings: Study protocol for a randomized controlled feasibility trial. *Pilot and Feasibility Studies*, *4*(1), 1–14.

Byrne, B. M. (2016). Adaptation of assessment scales in cross-national research: Issues, guidelines, and caveats. *International Perspectives in Psychology: Research, Practice, Consultation*, *5*, 51–65. https://doi.org/10.1037/ipp0000042

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the depression anxiety stress scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, *44*, 227–239. https://doi.org/10.1348/014466505X29657

Hitchcock, C., Werner-Seidler, A., Blackwell, S. E., & Dalgleish, T. (2017). Autobiographical episodic memory-based training for the treatment of mood, anxiety and stress-related disorders: A systematic review and meta-analysis. *Clinical Psychology Review*, *52*, 92–107. https://doi.org/10.1016/j.cpr.2016.12.003

Holmes, E. A., Blackwell, S. E., Burnett Heyes, S., Renner, F., & Raes, F. (2016). Mental imagery in depression: Phenomenology, potential mechanisms, and treatment implications. *Annual Review of Clinical Psychology*, *12*, 249–280.

Holmes, E. A., Lang, T. J., Moulds, M. L., & Steele, A. M. (2008). Prospective and positive mental imagery deficits in dysphoria. *Behaviour Research and Therapy*, *46*(8), 976–981. https://doi.org/10.1207/s15327752jpa4901_13

Ji, J. L., Holmes, E. A., & Blackwell, S. E. (2017). Seeing light at the end of the tunnel: Positive prospective mental imagery and optimism in depression. *Psychiatry Research*, *247*, 155–162.

Keyes, C. L. M. (2002). The mental health continuum: from languishing to flourishing in life. *Journal of Health and Social Behavior*, *43*(2), 207. https://doi.org/10.2307/3090197

Keyes, C. L. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology*, *73*(3), 539. https://doi.org/10.1037/0022-006X.73.3.539

Keyes, C. L. (2007). Promoting and protecting mental health as flourishing: a complementary strategy for improving national mental health. *American Psychologist*, *62*(2), 95.

Kind, P. (1996). The EuroQoL instrument: an index of health-related quality of life. *Quality of Life and Pharmacoeconomics in Clinical Trials*, 191–201.

Lukat, J., Margraf, J., Lutz, R., van der Veld, W. M., & Becker, E. S. (2016). Psychometric properties of the Positive Mental Health Scale (PMH-scale). *BMC Psychology*, *4*(1), 8. https://doi.org/10.1186/s40359-016-0111-x

Maercker, A., Zhang, X. C., Gao, Z., Kochetkov, Y., Lu, S., Sang, Z., Yang, S., Schneider, S., & Margraf, J. (2015). Personal value orientations as mediated predictors of mental health: A three-culture study of Chinese, Russian, and German university students. *International Journal of Clinical and Health Psychology*, *15*(1), 8–17.

Renner, F., Ji, J. L., Pictet, A., Holmes, E. A., & Blackwell, S. E. (2017). Effects of engaging in repeated mental imagery of future positive events on behavioural activation in individuals with major depressive disorder. *Cognitive Therapy and Research*, *41*, 369–380. https://doi.org/10.1007/s10608-016-9776-y

Renner, F., Murphy, F. C., Ji, J. L., Manly, T., & Holmes, E. A. (2019). Mental imagery as a "motivational amplifier" to promote activities. *Behaviour Research and Therapy*, *114*, 51–59. https://doi.org/10.1016/j.brat.2019.02.002

Saleem, S., Mahmood, Z., & Naz, M. (2013). Mental health problems in university students: A prevalence study. *FWU Journal of Social Sciences*, *7*(2), 124–130.

Schacter, D. L., Addis, D. R., & Buckner, R. L. (2008). Episodic simulation of future events: Concepts, data, and applications. *Annals of the New York Academy of Sciences*, *1124*(1), 39–60.

Stöber, J. (2000). Prospective cognitions in anxiety and depression: Replication and methodological extension. *Cognition & Emotion*, *14*(5), 725–729.

Szpunar, K. K., Spreng, R. N., & Schacter, D. L. (2014). A taxonomy of prospection: Introducing an organizational framework for future-oriented cognition. *Proceedings of the National Academy of Sciences*, *111*(52), 18414–18421.

Teismann, T., Forkmann, T., Brailovskaia, J., Siegmann, P., Glaesmer, H., & Margraf, J. (2018). Positive mental health moderates the association between depression and suicide ideation: A longitudinal study. *International Journal of Clinical and Health Psychology*, *18*(1), 1–7.

Trumpf, J., Becker, E. S., Vriends, N., Meyer, A. H., & Margraf, J. (2009). Rates and predictors of remission in young women with specific phobia: A prospective community study. *Journal of Anxiety Disorders*, *23*(7), 958–964.

Velten, J., Lavallee, K. L., Scholten, S., Meyer, A. H., Zhang, X.-C., Schneider, S., & Margraf, J. (2014). Lifestyle choices and mental health: A representative population survey in Germany. *BMC Psychology*, *2*, 55. https://doi.org/10.1186/s40359-014-0055-y

Wilson, A. C., Schwannauer, M., McLaughlin, A., Ashworth, F., & Chan, S. W. (2018). Vividness of positive mental imagery predicts positive emotional response to visually presented project soothe pictures. *British Journal of Psychology*, *109*(2), 259–276.