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The bidirectional relation between positive mental health and psychopathology in a longitudinal representative panel study

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Background: There is accumulating evidence that positive mental health and psychopathology should be seen as separate indicators of mental health. This study contributes to this evidence by investigating the bidirectional relation between positive mental health and psychopathological symptoms over time. *Methods:* Positive mental health (MHC-SF) and psychopathological symptoms (BSI) were longitudinally measured in a representative adult sample ($N = 1932$) on four measurement occasions in nine months. A cross-lagged panel design was applied and evaluated with a latent growth model combined with an item response theory measurement model. *Results:* Psychopathological symptoms were longitudinally related to positive mental health and vice versa, controlling for initial levels. The changes over time were even more important than the absolute levels of psychopathological symptoms and positive mental health, respectively. *Conclusions:* The results underline the need for a comprehensive perspective on mental health, incorporating both the treatment of symptoms and the enhancement of well-being.

Keywords: positive mental health; psychopathology; two-continua model; latent growth modeling; item response theory

In 2004, the World Health Organization (WHO, 2004) emphasized the need to approach mental health not only as the absence of psychopathology, but additionally as 'a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community' (p. 12). With the emergence of positive psychology, positive personal traits and positive aspects of our mental health gained attention in addition to deficits and pathology (Seligman & Csikszentmihalyi, 2000). This implies that the promotion of positive mental health should be an additional goal in public and mental health care that complements the treatment of psychopathology (Magyary, 2002). Indeed, there is accumulating evidence that the absence of psychopathological symptoms and disorders is only moderately related to the presence of positive mental health, which is called the two-continua model (Huppert & Whittington, 2003; Kendler, Myers, Maes, & Keyes, 2011; Keyes, 2002, 2005; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011; Macaskill, 2012; Weich et al., 2011; Westerhof & Keyes, 2009). This association is bidirectional: the presence of a mental illness affects positive mental health over time (Eack & Newhill, 2007; Hansson, 2006; Zatzick et al., 1997) and positive mental health longitudinally predicts the presence of psychopathology such as depression (Grant, Guille, & Sen, 2013; Keyes, Dhingra, & Simoes, 2010; Wood & Joseph, 2010).

However, most studies used a cross-sectional design with a single measurement occasion to corroborate the two-continua model of mental illness and mental health (Compton, Smith, Cornish, & Qualls, 1996; Greenspoon & Saklofske, 2001; Headey, Kelley, & Wearing, 1993; Keyes, 2006; Keyes, Eisenberg, Dhingra, Perry, & Dube, 2012; Keyes et al., 2008; Massé et al., 1998; Suldo & Shaffer, 2008; Westerhof & Keyes, 2009). The few longitudinal studies that exist have focused on either the prediction of future positive mental health by psychopathology (Eack & Newhill, 2007; Hansson, 2006; Zatzick et al., 1997) or the prediction of future psychopathology by positive mental health (Grant et al., 2013; Keyes et al., 2010; Wood & Joseph, 2010). The present study is the first to gain insight into the bidirectional relation between positive mental health and psychopathology, by directly comparing the strength of the predictive associations. We broadly measure psychopathology by a large variety of symptoms and assess positive mental health by including emotional, psychological as well as social well-being (Keyes, 2002) in a representative population sample. By using four measurement occasions in a nine-month period, we can not only evaluate the relations between the *levels* of psychopathological symptoms and positive mental health, but also between the *changes* in both continua.

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Furthermore, we applied robust and sophisticated statistical analyses, using a combination of latent growth modeling and item response theory (IRT). In line with the two-continua model (Keyes, 2005), we hypothesize that the level and changes in psychopathological symptoms are related to positive mental health, as well as that the level and changes in positive mental health are related to psychopathological symptoms, when controlling for initial levels of both mental health indicators.

Method

Procedure and participants

This paper draws on data of the LISS panel of CentERdata, a representative internet panel for Longitudinal Internet Studies in the Social sciences. The panel consists of 5000 households, which are randomly selected from the municipal registers in the Netherlands. Household members are invited to fill out online questionnaires every month and households are provided with internet access or a personal computer when necessary. In one-third of the households, one member was selected to fill out questionnaires on mental health in December 2007 (T_0), and March (T_1), June (T_2) and September 2008 (T_3). After complete description of the study to the subjects, written informed consent was obtained. In total, 1932 respondents filled out this module at one or more measurement occasions (1662 at T_0; 1675 at T_1; 1243 at T_2; 1466 at T_3). Half of the respondents (50.8%) filled out all four modules.

The final sample of 1932 Dutch respondents was stratified by age group (18–29; 30–49; 50–64; 65+), gender, and whether the respondents were native Dutch or not. Of the respondents, 20.7% were between 18–29 years old, 29.2% were 30–49 years old, 26.3% were 50–64 years old, and 23.8% were 65+. Half of the respondents were male (49.4%) and married (52.7%). The majority was native Dutch (77.6%), and for 4.9% information on their origin was missing. Of the respondents, 10.0% had primary education (6 years), 26.5% lower vocational (10 years), 11.4% secondary (11–12 years), 22.3% middle vocational (13 years), 21.4% higher vocational (15 years), and 8.4% had university education (16 years). Respondents who completed all measurements did not differ in terms of gender, marital status, migratory status, educational level, psychopathological symptoms, or positive mental health ($p > 0.05$), but they were older than the respondents who did not complete four measurements ($F(1,1930) = 7,27$; $p < 0.05$).

Measures

The mental health continuum-short form (MHC-SF) (Keyes et al., 2008; Lamers et al., 2011) was used to measure positive mental health. The MHC-SF consists of 14 items which represent theoretically derived feelings of well-being. Respondents rated the frequency of each feeling in the past month on a Likert scale from 0 (*never*) to 5 (*every day*). Higher scores indicate higher levels of positive mental health. The Dutch version of the MHC-SF has shown good psychometric properties (Lamers et al., 2011) and stability in the item parameters over time (Lamers, Glas, Westerhof, & Bohlmeijer, 2012). Model fit to the IRT model, that is, unidimensionallity and constancy of item parameters over time, was evaluated by LM statistics (Glas, 1999) computed using the public domain software package MIRT (Glas, 2010). For the MHC, 14 items were evaluated at 4 time points. This resulted in 56 fit statistics. 11 of the 56 model tests were significant at the 5% level. Further, the effect size, that is, the absolute difference between observed and expected item responses, was never more than 0.04 on a scale ranging from 0.00 to 1.00. Therefore, it was concluded that the model fit was acceptable. In the present study, Cronbach's alpha for positive mental health varied between 0.89 (T_0) and 0.91 (T_2).

The Brief Symptom Inventory (BSI; Dutch version) (de Beurs & Zitman, 2006) was used to measure psychopathology. It is among the most commonly used instruments for screening and assessing psychopathology in mental health services in the US. Respondents indicated the degree to which they had experienced 53 psychological symptoms in the past week using a five-point Likert scale from 0 (*not at all*) to 4 (*a lot*). Higher scores indicate higher levels of psychopathology. Also for the BSI, model fit was evaluated by computing LM statistics for 53 items at 4 time points. 31 of the 212 model tests were significant at the 5% level. Further, the effect size, that is, the absolute difference between observed and expected item responses, was never more than 0.04 on a scale ranging from 0.00 to 1.00. Therefore, also here it was concluded that the model fit was acceptable. The Cronbach alpha's were 0.95 (T_0, T_1 and T_2) and 0.96 (T_3) in the present study.

Statistical analyses

The interdependence of positive mental health and psychopathology was evaluated using data in a cross-lagged panel design (see Shadish, Cook, & Campbell, 2002). The statistical analyses were done using a combination of latent growth modeling (see McArdle & Hamagami, 2001; Skrondal & Rabe-Hesketh, 2004) with an IRT model. The advantage of using an IRT model is that it accounts for measurement error using all available information on the level of individual item responses; hence the alternative name full-information factor analysis (Bock, Gibbons, & Muraki, 1988). By estimating latent variables using all the information in the item responses, there is less confounding between the measurement error

and true change in positive mental health and psychopathology over time, resulting in less biased and more precise estimation. Moreover, missing data are easily accommodated. So both the item responses to the MHC and BSI were modeled by an IRT model for polytomously scored items, the sequential model by Tutz (1997). The results obtained using this model are analogous to those obtained with other much used models, such as the graded response model and the partial credit model (Verhelst, Glas, & de Vries, 1997). That is, for all three models, the fit of the response functions of the items to the observed responses and the inferences made using the estimated values of the latent variables are comparable. In the sequential model, every item response of a person labeled n to an item labeled i was modeled by an individual latent person parameter θ_n and one or more item parameters. In the present case, two measurement instruments at four measurement occasions were available. The associated latent variables were denoted by $\theta_{nt}^{(\mathrm{MHC})}$ and $\theta_{nt}^{(\mathrm{BSI})}$, for the measurement occasions $t = 0, \ldots, 3$, respectively. The latent variables were identified in such a way that high values correspond to high expected scores on the instruments.

In the analysis, we predicted the levels of positive mental health and psychopathology from their previous levels and from the change in these levels using two sets of latent regression equations:

$$\theta_{nt}^{(\mathrm{MHC})} = \delta_1 \theta_{nt-1}^{(\mathrm{MHC})} + \delta_2 \theta_{nt-1}^{(\mathrm{BSI})} + \delta_3 \left(\theta_{nt}^{(\mathrm{BSI})} - \theta_{nt-1}^{(\mathrm{BSI})} \right) + \varepsilon_{nt}^{(\mathrm{MHC})}$$

and

$$\theta_{nt}^{(\mathrm{BSI})} = \delta_4 \theta_{nt-1}^{(\mathrm{BSI})} + \delta_5 \theta_{nt-1}^{(\mathrm{MHC})} + \delta_6 \left(\theta_{nt}^{(\mathrm{MHC})} - \theta_{nt-1}^{(\mathrm{MHC})} \right) + \varepsilon_{nt}^{(\mathrm{BSI})},$$

for $t = 1, \ldots, 3$, where again $\varepsilon_{nt}^{(\mathrm{MHC})}$ and $\varepsilon_{nt}^{(\mathrm{BSI})}$ are normally distributed independent error terms. So the current level of positive mental health, $\theta_{nt}^{(\mathrm{MHC})}$ was predicted from the previous level of positive mental health $\theta_{nt-1}^{(\mathrm{MHC})}$, the previous level of psychopathology $\theta_{nt-1}^{(\mathrm{BSI})}$ and the change in psychopathology $(\theta_{nt}^{(\mathrm{BSI})} - \theta_{nt-1}^{(\mathrm{BSI})})$, where δ_1, δ_2 and δ_3 were the three regression coefficients. The model for the prediction of psychopathology was built up analogously. The models were first estimated separately for each instrument and each measurement occasion $t = 1, \ldots, 3$ separately, and then for both instruments and all measurement occasions simultaneously. The models are depicted graphically in Figure 1.

The purpose of the six separate models was to evaluate, for each of the two constructs, the predictive power of a previous administration of the two instruments on the current administration and to evaluate the additional effect of the change in one construct on the other construct. Note that the change on the construct itself was already modeled by taking into account the previous administration of the associated measurement instrument. Note further that the number of latent variables is equal to the number of regression coefficients estimated, so given the number of variables involved in the model, the model is completely saturated and the main interest is in evaluating whether the models are similar on the three time points for each of the two constructs.

The concurrent model for both constructs and all time points provided insight into the question whether psychopathology was a stronger indicator for positive mental health than vice versa. It is assumed that the regression coefficients of the paths in the model are constant over time. So the number of latent variables involved is eight, and the number of regression coefficients estimated is six. The autocorrelation between two administrations of the same instrument is modeled by using the previous administration as a predictor.

All models were estimated in a Bayesian framework using the OpenBugs software (Lunn, Spiegelhalter, Thomas, & Best, 2009). The parameters of the IRT models were estimated concurrently with the parameters of the latent growth models.

Results

The aim of the present study was to gain insight into the bidirectional relation between psychopathological symptoms and positive mental health during a nine-month period, by investigating whether level and changes in psychopathological symptoms are associated with levels of positive mental health and whether levels and changes in positive mental health are associated with levels of psychopathological symptoms. First, we estimated these associations separately for predicting positive mental health or psychopathological symptoms, and for the four measurement occasions. Figure 1 illustrates the model.

Panel A (on the left) shows an example of level and change in psychopathological symptoms in relation to positive mental health. Change in psychopathology between T_1 and T_0 (δ_3) was included in the model as a predictor of positive mental health at T_1, when controlling for positive mental health at T_0 (δ_1) and psychopathology at T_0 (δ_2). The upper panel in Table 1 shows the results.

The column labeled 'estimates' gives the parameter estimates in terms of the IRT model, the column labeled 'standardized estimates' gives the standardized estimates to support the variance explained by the regression models. There was a high auto-regression of positive mental health at T_0 and T_1 ($\delta_1 = 0.81$), but psychopathology at T_0 had an additional negative association with positive

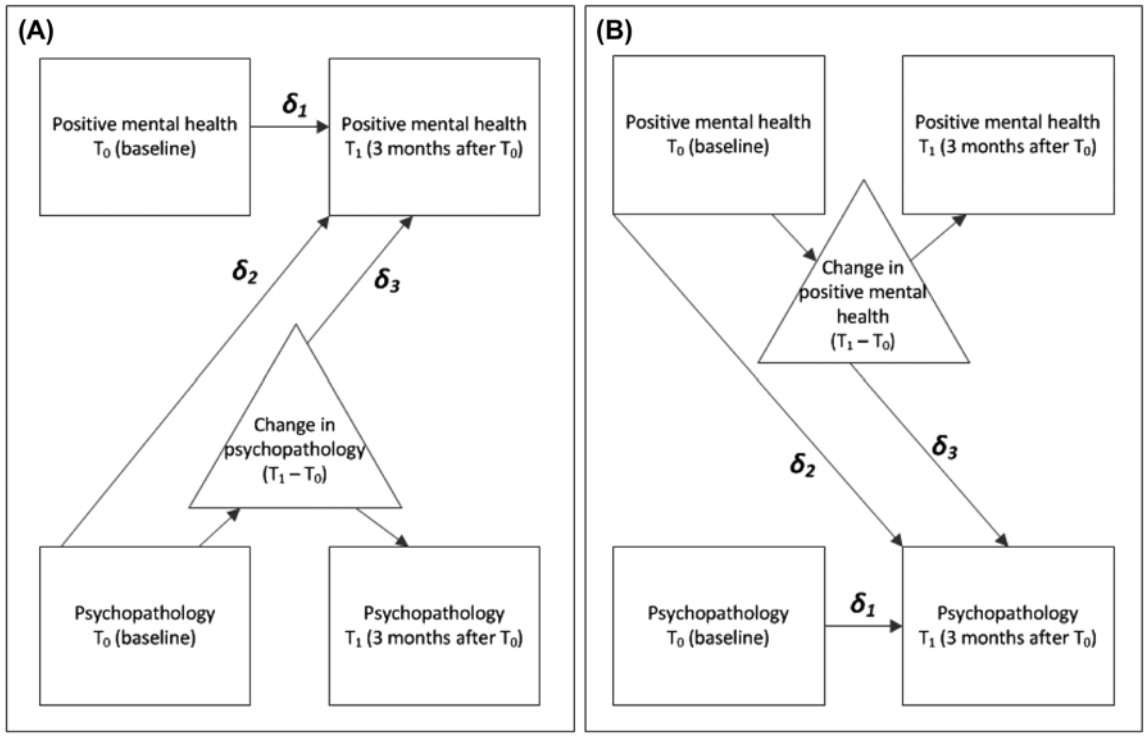

Figure 1. Panel A (on the left) shows an example of change in psychopathology as a predictor of positive mental health. In this example, change in psychopathology between T_1 and T_0 ($\delta 3$) is included in the model as a predictor of positive mental health at T_1, when controlling for positive mental health at T_0 (δ_1) and psychopathology at T_0 (δ_2). Panel B (on the right) shows an example of change in positive mental health as a predictor of psychopathology. In this example, change in positive mental health between T_1 and T_0 (δ_3) is included in the model as a predictor of psychopathology at T_1, when controlling for psychopathology at T_0 (δ_1) and positive mental health at T_0 (δ_2).

Table 1. Change in psychopathology as a predictor of positive mental health at T_1, T_2, and T_3, in line with the model in Figure 1(A).

	Parameter	Estimate (SD)	Standardized estimate (SD)
Positive mental health T_1			
MHC T_0	δ_1	0.81 (0.02)*	0.64 (0.02)*
BSI T_0	δ_2	−0.20 (0.03)*	−0.16 (0.02)*
Change in BSI $T_1 - T_0$	δ_3	−0.34 (0.04)*	−0.27 (0.03)*
Unexplained variance	Var	0.78 (0.04)*	0.49 (0.03)*
Positive mental health T_2			
MHC T_1	δ_1	0.82 (0.03)*	0.68 (0.03)*
BSI T_1	δ_2	−0.06 (0.03)*	−0.05 (0.03)*
Change in BSI $T_2 - T_1$	δ_3	−0.23 (0.04)*	−0.19 (0.04)*
Unexplained variance	Var	0.71 (0.05)*	0.50 (0.04)*
Positive mental health T_3			
MHC T_2	δ_1	0.78 (0.03)*	0.63 (0.03)*
BSI T_2	δ_2	−0.16 (0.03)*	−0.13 (0.03)*
Change in BSI $T_3 - T_2$	δ_3	−0.34 (0.03)*	−0.27 (0.03)*
Unexplained variance	Var	0.78 (0.04)*	0.51 (0.03)*

Note: MHC = measure for positive mental health; BSI = measure for psychopathology.
*$p < 0.05$.

mental health at T_1 ($\delta_2 = -0.20$). Most important, the change in psychopathology between T_1 and T_0 contributed significantly to the level of positive mental health at T_1 ($\delta_3 = -0.34$). The change in psychopathology showed even stronger associations to the level of positive mental health at T_1 than the absolute level of psychopathology earlier in time (at T_0). Together, positive mental health and psychopathology at T_0 and change in

psychopathology between T_1 and T_0 explained 51% of the variance in positive mental health at T_1.

In line with this model, we conducted similar analyses in predicting positive mental health at T_2 from the change in psychopathology between T_2 and T_1, while controlling for positive mental health and psychopathology at T_1, and in predicting positive mental health at T_3 from the change in psychopathology between T_3 and T_2, while controlling for positive mental health and psychopathology at T_2. These results were similar to those for positive mental health at T_1 (see the middle and bottom panel of Table 1). In each of the three analyses, there was a high auto-regression between levels of positive mental health. Moreover, change in psychopathological symptoms was more important for future positive mental health than the absolute degree of psychopathology. The similarity of the results at each of the three measurement occasions (T_1, T_2, and T_3 as outcome) underlines the stability of the findings.

In addition, we investigated the longitudinal associations of change in positive mental health to psychopathological symptoms. Panel B (on the right) in Figure 1 shows an example where change in positive mental health between T_1 and T_0 (δ_3) is included in the model as predictor of psychopathological symptoms at T_1, when controlling for psychopathological symptoms at T_0 (δ_1) and positive mental health at T_0 (δ_2). Again, we conducted three analyses in predicting psychopathology at T_1, T_2, and T_3 from the change in positive mental health between T_1 and T_0, between T_2 and T_1, and between T_3 and T_2, respectively, where we controlled for earlier levels of psychopathology and positive mental health. The results are shown in Table 2.

For example, the upper panel of Table 2 shows the results of the model in Panel B (on the right) of Figure 1. There was a high association between psychopathology at T_0 and T_1 ($\delta_1 = 0.86$), and an additional negative association of positive mental health at T_0 to psychopathology at T_1 ($\delta_2 = -0.13$). Change in positive mental health between T_1 and T_0 was negatively and significantly associated with psychopathology at T_1 ($\delta_3 = -0.21$). The explained variance was 64%. The analyses on psychopathology at T_2 and T_3 showed similar results (see the middle and bottom panel of Table 2).

In general, the pattern is similar to the pattern for psychopathology in the prediction of positive mental health. There was a positive auto-regression, and the change in psychopathology or positive mental health showed stronger associations than the absolute level of psychopathology or positive mental health. In line with our hypothesis, changes in psychopathological symptoms were related to positive mental health, while at the same time changes in positive mental health were related to psychopathological symptoms. The explained variance was higher for psychopathology than for positive mental health, indicating that changes in positive mental health may be better predictors of psychopathology than vice versa. However, the analyses were conducted separately and are therefore not directly comparable. In the next analysis, we simultaneously estimated the longitudinal bidirectional associations between psychopathological symptoms and positive mental health, using all four measurement occasions.

Table 3 shows the results of the simultaneous estimation of change in psychopathological symptoms as a predictor of positive mental health and change in positive mental health as a predictor of psychopathological symptoms, using the four measurement occasions. In line with the separate analyses, there was a high auto-regression for both positive mental health ($\delta_1 = 0.92$) and

Table 2. Change in positive mental health as a predictor of psychopathology at T_1, T_2, and T_3, in line with the model in Figure 1(B).

	Parameter	Estimate (SD)	Standardized estimate (SD)
Psychopathology T_1			
BSI T_0	δ_1	0.86 (0.02)*	0.77 (0.02)*
MHC T_0	δ_2	−0.13 (0.02)*	−0.12 (0.02)*
Change in MHC $T_1 - T_0$	δ_3	−0.21 (0.02)*	−0.19 (0.02)*
Unexplained variance	Var	0.45 (0.05)*	0.36 (0.04)*
Psychopathology T_2			
BSI T_1	δ_1	0.94 (0.03)*	0.77 (0.03)*
MHC T_1	δ_2	−0.12 (0.03)*	−0.09 (0.03)*
Change in MHC $T_2 - T_1$	δ_3	−0.19 (0.03)*	−0.15 (0.03)*
Unexplained variance	Var	0.56 (0.03)*	0.38 (0.03)*
Psychopathology T_3			
BSI T_2	δ_1	0.86 (0.02)*	0.73 (0.02)*
MHC T_2	δ_2	−0.13 (0.03)*	−0.11 (0.03)*
Change in MHC $T_3 - T_2$	δ_3	−0.30 (0.03)*	−0.26 (0.02)*
Unexplained variance	Var	0.53 (0.03)*	0.39 (0.02)*

Note: MHC = measure for positive mental health; BSI = measure for psychopathology.
*$p < 0.05$.

Table 3. Change in psychopathology as a predictor of positive mental health and change in positive mental health as a predictor of psychopathology in a simultaneous model using all four measurement occasions ($T_0 - T_3$).

	Parameter	Estimate (SD)	Standardized estimate (SD)
Positive mental health			
MHC	δ_1	0.92 (0.01)*	0.66 (0.01)*
BSI	δ_2	0.05 (0.01)*	0.03 (0.01)*
Change in BSI	δ_3	−0.85 (0.03)*	−0.61 (0.03)*
Unexplained variance	Var	0.39 (0.02)*	0.20 (0.02)*
Psychopathology			
BSI	δ_4	1.00 (0.01)*	0.79 (0.01)*
MHC	δ_5	0.01 (0.01)	0.01 (0.01)
Change in MHC	δ_6	−0.58 (0.02)*	−0.46 (0.02)*
Unexplained variance	Var	0.26 (0.02)*	0.16 (0.02)*

Note: BSI = measure for psychopathology; MHC = measure for positive mental health.
*$p < 0.05$.

psychopathology ($\delta_4 = 1.00$). Initial levels of psychopathology showed an association with positive mental health ($\delta_2 = 0.05$), whereas the association of initial levels of positive mental health to later psychopathological symptoms was not significant. Remarkably, change in psychopathological symptoms as well as change in positive mental health were much more important predictors of positive mental health and psychopathological symptoms, respectively ($\delta_3 = -0.85$ and $\delta_6 = -0.58$). A decrease in psychopathology was associated with better positive mental health, whereas a decrease in positive mental health was associated with a higher level of psychopathological symptoms. Since the latent variables were estimated simultaneously, these estimates were directly comparable. The findings show that changes in psychopathology were better predictors of future positive mental health, than changes in positive mental health were of future psychopathology. By including initial levels of positive mental health and psychopathology at four measurement occasions, as well as changes in positive mental health and psychopathology in a single model, we were able to explain more than two-thirds of the variance in positive mental health and psychopathology. Finally, an analogous analysis was carried out without the change in positive mental health and psychopathology as indicators. Comparing this analysis with the analysis of Table 3 showed that change in psychopathology accounted for 27% of the variance in positive mental health, and that change in positive mental health accounted for 18% of the variance in psychopathology.

Discussion

The present study used highly sophisticated analyses to examine the bidirectional relation between psychopathological symptoms and positive mental health in a representative sample of Dutch adults ($N = 1932$) with multiple measurements and comprehensive instruments. The study provides further support for the two-continua model of mental health and illness, that distinguishes between psychopathology and positive mental health as correlated yet separate dimensions (Keyes, 2002). The study shows that changes in psychopathology were predictive for levels of positive mental health, and vice versa. Not only can the presence of psychopathology be a risk factor for a low well-being, persons with a low well-being also have a higher risk to experience psychopathological symptoms in the future. The finding that the bidirectional relations remain after statistically controlling for initial levels of psychopathology and positive mental health reveals that both dimensions should be seen as complementary. This would not have been possible from a more traditional view that mental illness and mental health are mere opposites.

Our study is innovative in several ways. We could expand findings from previous longitudinal studies that already established the effects of psychopathological symptoms on emotional well-being (Eack & Newhill, 2007; Hansson, 2006; Zatzick et al., 1997). Our study shows that psychopathological symptoms are also related to a broader conceptualization of positive mental health, including emotional, psychological, and social well-being (Keyes, 2002). This is in agreement with the definition of mental health by the World Health Organization (WHO, 2004). Furthermore, by including a broad measure of psychopathological symptoms, our findings expand previous studies that indicated that positive mental health may act as a buffer against specific psychopathologies, such as depression (Grant et al., 2013; Keyes et al., 2010; Wood & Joseph, 2010), and frailty (Gale, Cooper, Deary, & Sayer, 2014). Our results support the promotion and protection hypotheses that gains in levels of positive mental health decrease the risk of mental illness over time (*promotion*) and losses of positive mental health increase the risk of mental illness over time (*protection*) (Keyes, 2010). By using more sophisticated analyses, we could add that the effects of psychopathological symptoms and positive mental health are indeed

bidirectional. This confirms the need for a unified and integrated psychology including both the traditional and positive psychology (Linley, Joseph, Harrington, & Wood, 2006). Last, by adding more measurement points than previous studies, we were able to show that changes in psychopathology and positive mental health are even more important than the absolute levels in predicting psychopathological symptoms and positive mental health, respectively. This underlines the importance of monitoring positive mental health and psychopathology over time, for example by Routine Outcome Measurement in mental health care (Slade, Thornicroft, & Glover, 1999).

Future research should investigate the clinical implications of these findings. Whereas we used a measure for psychopathological symptoms, further research could make use of diagnostic interviews in order to assess the reciprocal relations between mental illnesses and positive mental health. Moreover, positive mental health consists of different components (Baumeister, Vohs, Aaker, & Garbinsky, 2013). Although we used comprehensive measures of psychopathological symptoms and positive mental health, earlier cross-sectional studies have shown that the pattern becomes more differentiated when different mental illnesses as well as the different components of positive mental health are distinguished (Lamers et al., 2012; Westerhof & Keyes, 2009). This will also provide further insights in the dynamics of the relationships between psychopathology and positive mental health that will be of help when developing interventions and therapies. A topic that has not been much investigated yet is whether the relations between psychopathology and positive mental health are similar in patients as in the general population. Further research is also needed to establish the reciprocal relationships within treatments and interventions. This asks for the inclusion of measures of positive mental health in clinical trials as well as in routine outcome monitoring. Our recent studies (Fledderus, Bohlmeijer, Pieterse, & Schreurs, 2011; Korte, Bohlmeijer, Cappeliez, Smit, & Westerhof, 2011) have shown that interventions result in the alleviation of psychopathological symptoms as well as the enhancement of positive mental health. Further research is needed to assess whether these are independent effects and how they mutually influence each other over time. The studies of Fava on well-being therapy constitute an interesting approach in this regard. These studies show that enhancing positive mental health after a regular treatment of depression or anxiety is effective in preventing the recurrence of those disorders (Fava & Ruini, 2003). Such studies would also profit from longitudinal studies over longer periods of time.

Despite these suggestions for further research, we consider our study as valuable and informative as it contributed to earlier studies in providing support to the two-continua model of mental illness and mental health. The bidirectional relation between positive mental health and psychopathology emphasizes the need for a comprehensive perspective on mental health, incorporating both the treatment of symptoms and the enhancement of well-being. With this, our findings tie in with recent developments in mental health care to monitor mental health by Routine Outcome Measurement and in positive psychology to enhance positive mental health in addition to the prevention and treatment of psychopathological symptoms.

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