

ORIGINAL ARTICLE

Healthy emotionality protects from the detrimental well-being consequences of low economic status

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Abstract

Low economic status is linked to poorer mental and physical well-being, but individual differences in emotional and cognitive resources may buffer this relationship. Indeed, previous research has shown that people with low income but a high sense of control have comparable levels of life satisfaction and health to people with higher income. Building on this, we conducted two cross-sectional online studies with US participants to examine whether healthy emotionality—a predisposition to adaptive affective responses—buffers the negative effects of low economic status on well-being. In Study 1 ($N = 259$), participants completed the Emotional Style Questionnaire, rated their life satisfaction and health, and reported annual household income. In Study 2 ($N = 902$), we used more comprehensive assessments of income and well-being, and additionally compared the moderating effects of healthy emotionality and sense of control. In both studies, healthy emotionality significantly moderated the relationship between income and well-being: individuals with high healthy emotionality maintained higher well-being despite low economic

status. This buffering effect remained significant when the sense of control was included in the model. These results suggest that healthy emotionality is a robust resilience factor against socioeconomic adversity that goes beyond the protective role of perceived control.

KEYWORDS

economic status, healthy emotionality, sense of control, well-being

INTRODUCTION

Low economic status has been robustly linked to poorer mental and physical well-being (Everson et al., 2002; Kaplan et al., 2008; Lynch et al., 1997). However, research has revealed that this relationship is subject to moderation by an individual's sense of control. Specifically, in a notable study, Lachman and Weaver (1998) found that individuals in the lowest income group with a high sense of control had levels of psychological and physical well-being comparable to those in the higher income groups. An important question of both theoretical and practical interest is whether there are other protective factors, like sense of control, that can moderate the relationship between economic status and well-being.

In this article, we propose that healthy emotionality—an individual's predisposition toward adaptive affective responses—buffers the adverse effects of low economic status on well-being. We tested this hypothesis in two studies, with Study 1 providing an initial examination of the buffering role of healthy emotionality and Study 2 extending these findings by employing more comprehensive measures and comparing the effect of healthy emotionality against that of a sense of control.

The effect of economic status on well-being

The impact of economic status on aspects of well-being has been studied widely. The relationship between life satisfaction and income is not straightforward (Biswas-Diener, 2008). However, despite relatively low correlation coefficients observed in some studies (e.g., Cummins, 2000; Lucas & Schimmack, 2009), the consensus is that wealth plays an important role in psychological well-being (e.g., Diener et al., 2012; Gardner & Oswald, 2007; Jorgensen et al., 2010; Killingsworth, 2021; Lindqvist et al., 2020). This is particularly the case for people on the lower rungs of the social ladder. Even though money by itself does not guarantee happiness, its absence is linked to several negative psychological consequences (Kushlev et al., 2015).

Numerous mechanisms might explain the association between low economic status and adverse well-being outcomes. Limited access to essential resources such as housing, healthcare, or nutritious food can impact well-being both directly and indirectly, as a source of psychological distress (Ciciurkaite & Brown, 2022). Indeed, financial instability and economic hardship can lead to chronic stress as people struggle to meet their basic needs, greatly threatening psychological and physical health. Against this background, it is not surprising that persistent poverty is a strong predictor of psychopathology—mainly in the form of depression and anxiety

(Grant et al., 2004; Miech et al., 1999; Palacios-Barrios & Hanson, 2019; Peverill et al., 2021; Wadsworth et al., 2008), but also cognitive deficiencies (Mani et al., 2013). Low economic status has also been linked to poorer physical health, including somatic complaints (Santiago et al., 2011) and chronic pain conditions (Newman et al., 2017; Reynolds et al., 2001). Moreover, living in poverty usually means living in a poor neighborhood full of environmental stressors that might further dampen well-being (Gaitán-Rossi et al., 2021).

In sum, low economic status exposes people to many stressors that they might have difficulty coping with, due to their financial constraints and limited access to resources. This not only creates distress in itself, but is also likely to set in motion dynamics that further exacerbate their quality of life and well-being. Crucially, this vicious cycle could be mitigated if the individual has some interpersonal and/or intrapersonal resources that cushion the negative impact of their adverse economic situation. In this article, we test the hypothesis that healthy emotionality serves as one such resource, buffering the negative ramifications of low economic status on mental and physical well-being.

Healthy emotionality

The term healthy emotionality refers to a general predisposition toward adaptive affective responses, which is central to psychological well-being (Kesebir et al., 2019). This predisposition is reflected in the differences in specific emotional states that people tend to experience (e.g., sadness vs. joy), as well as the duration and intensity of these emotional states. According to Davidson (Davidson & Begley, 2012), healthy emotionality can be defined and measured by six dimensions of emotional style, which are governed by specific brain circuits (Davidson, 1998; Davidson & Begley, 2012; Kesebir et al., 2019). These six dimensions are labeled *Outlook*, *Resilience*, *Social Intuition*, *Self-Awareness*, *Sensitivity to Context*, and *Attention*. These dimensions primarily capture the temporal dynamics of emotions, the ability to read and regulate emotions, and adjust reactions and behavior on that basis (Davidson & Begley, 2012; Kesebir et al., 2019). Healthy emotionality and its six dimensions have been measured using the 24-item Emotional Style Questionnaire (ESQ; Kesebir et al., 2019). Table 1 includes the definition of each dimension and sample ESQ items that measure this dimension.

The ESQ provides separate scores for each of the six dimensions of emotional style, and it has also been validated to stand on its own as a measure of healthy emotionality. In other words, the ESQ has dual functions: It serves as a multidimensional assessment capturing an individual's stance on distinct emotional dimensions, while at the same time providing a higher-order score representing a general factor of healthy emotionality. Research demonstrates moderate to large correlations between healthy emotionality as measured by the ESQ and various psychological well-being variables (Kesebir et al., 2019). Attesting to the construct validity of the measure, these correlations include the levels of depressive symptoms, neuroticism, flourishing, stress, vitality, negative affect, positive affect, and satisfaction with life (Kesebir et al., 2019, Study 3). The Outlook and Resilience dimensions of healthy emotionality show the strongest associations with psychological well-being, reflecting their roles in sustaining positive and recovering from negative emotions, respectively (Kesebir et al., 2019; Nazari & Griffiths, 2020).

Beyond its associations with general well-being measures, healthy emotionality has also demonstrated protective effects under challenging circumstances. Specifically, Yao et al. (2022) showed that healthy emotionality moderates the association between fear of COVID-19 and mental health problems (e.g., depression, anxiety, insomnia, social dysfunction, somatic

TABLE 1 The dimensions of healthy emotionality and sample items from the emotional style questionnaire (ESQ).

Dimension name	Definition	Sample item from ESQ
Outlook	The ability to sustain positive emotion over time	“I find it easy to be hopeful about the future.”
Resilience	The ability to recover from negative emotion	“When I’m in a bad mood, it tends to last a long time.” (reverse-coded)
Social intuition	The degree of attunement to nonverbal social cues	“I am sensitive to other people’s emotions.”
Self-awareness	The degree of attunement to the physiological and emotional cues that arise within one’s body	“I am not good at identifying my own feelings.” (reverse-coded)
Sensitivity to context	The degree with which one’s emotional and behavioral responses take into account the social context	“I have sometimes been told that I behaved in a socially inappropriate way.” (reverse-coded)
Attention	The ability to screen out distractions and stay focused	“I have good concentration skills.”

symptoms). In their study, fear of COVID-19 was associated with higher levels of mental health problems for individuals with low and average levels of healthy emotionality. In contrast, for individuals with high levels of healthy emotionality, fear of COVID-19 and mental health problems were not related (Yao et al., 2022). These findings illustrate how healthy emotionality can function as an intrapersonal resource to shield oneself from the undesirable effects of certain adverse circumstances. In the present work, we focused on low income as another example of such adverse circumstances.

The protective role of healthy emotionality against low income

Healthy emotionality refers to a predisposition toward adaptive affective responses—responses that have positive effects on a person’s functioning. It follows from this definition that people with higher levels of healthy emotionality should be better protected from the negative psychological and physiological consequences of low income. We assume that this protection does not result from isolated emotional traits, but from the combined effect of several emotional capacities working in synergy with each other.

One way this synergistic protective effect manifests is through enhanced stress regulation. Healthy emotionality supports more effective stress regulation, a crucial protective mechanism in the face of financial stress. Research has shown a strong negative correlation between healthy emotionality and self-reported stress levels (Kesebir et al., 2019, Study 3), suggesting that people with higher healthy emotionality respond more constructively to financial stressors while being better shielded from prolonged physiological stress responses that impair health. Not only would they be better able to cope with stress, but they would also be more likely to have the energy and drive to pursue their goals, ultimately leading to a greater sense of well-being. Additionally, healthy emotionality facilitates the development of strong social relationships that provide both emotional support and tangible resources for people in financial need.

Although each of the six dimensions of healthy emotionality might offer specific benefits (see Table S1 in the Supplementary Materials), we believe that their coordination within the broader construct of healthy emotionality provides the strongest protection. Together, these dimensions form a flexible, responsive emotional system that supports coping, connection, and purpose under adverse conditions. This synergy makes the whole of healthy emotionality—rather than any single dimension—a powerful buffer against the psychological and physiological risks associated with low income.

Sense of control

Control can be defined as the actual or perceived ability to change events and achieve desired results. The desire for control is considered a fundamental human motivation (Greenaway et al., 2015; Skinner, 1996), and a sense of control a vital factor that “makes a person happy, healthy, wealthy and wise” (Lachman et al., 2015, p. 5). Research supports the view that being in control provides psychological well-being and physical health (Whitson & Galinsky, 2008), while a lack of control is experienced as a troubling and aversive state (Rutjens & Kay, 2017). For example, when people have control over their environment—or even are under the illusion that they have the power to do so—they can withstand painful shocks for longer or recover from illness in less time than when they believe they have no control over their environment (Seligman, 1975).

Relevant to the purposes of this article, a sense of control has been found to act as a buffer against the negative effects of stressors: People who perceive themselves to be in control experience greater self-efficacy and use their resources more effectively to cope, so that adverse circumstances are less likely to harm them (Infurna et al., 2011). Indeed, as noted above, a sense of control has been shown to act as a buffer against the negative well-being consequences of inadequate financial resources (Lachman & Weaver, 1998). Lachman and Weaver (1998) demonstrated that differences between social classes in health and well-being were moderated by a sense of control, such that participants in the lowest income group with a high sense of control had comparable levels of health and life satisfaction to participants in higher income groups. Looked at differently, participants with the highest sense of control exhibited the highest levels of psychological well-being—regardless of their income, while the lower the individuals' sense of control, the more their well-being depended on their income.

Sense of control is not the only psychosocial resource capable of moderating the relationship between low economic status and well-being. For example, Cummins (2000) theorized that beliefs such as optimism and self-esteem may also play the role of such a buffer. Empirical studies, furthermore, point to the importance of social networks and support. A large study in Sweden found that among people struggling with the most severe financial problems, social support was the strongest buffer for psychological well-being (Åslund et al., 2014). Relatedly, others have concluded that a sense of community can play a protective role in mitigating the negative effects of economic hardship on well-being (Reeskens & Vandecasteele, 2017).

Healthy emotionality and sense of control

To our knowledge, the relationship between healthy emotionality and sense of control has not yet been empirically assessed. However, based on theory, we would expect a positive relationship and some overlap between these two constructs. For one, healthy emotionality

and sense of control are positive resources that benefit general health and psychological well-being (Kesebir et al., 2019; Lachman & Weaver, 1998). Furthermore, people who believe that they can control the course of events in their lives have been shown to exhibit higher optimism (e.g., Jiménez et al., 2017; C. T. F. Klein & Helweg-Larsen, 2002) and higher resilience (e.g., Greeff & Du Toit, 2009; Parker et al., 1990), which correspond closely to the Outlook and Resilience dimensions of healthy emotionality. In contrast, a low sense of control is linked to poorer emotional health, as evinced by higher levels of psychopathology associated with helplessness and an external locus of control (Hale & Cochran, 1987; Lefcourt, 2014).

While expecting a positive association between healthy emotionality and sense of control, we hypothesize that healthy emotionality would buffer the adverse effects of low economic status on well-being beyond the effect of sense of control. Our rationale is that a sense of control is presumably subsumed under healthy emotionality, whereas the opposite cannot be said. The components of healthy emotionality (e.g., Resilience, Outlook, Attention) are either directly related to a greater sense of control or facilitate it indirectly. As a result, a person with high levels of healthy emotionality would likely also report reasonably high levels of sense of control. Yet we cannot expect that a high sense of control will necessarily lead to high levels of healthy emotionality in all its various aspects. To illustrate, we can imagine a person who feels a great deal of control over their life (due to an advantageous socioeconomic situation, for example) but has poor social relationships and does not experience joy in life, thus exhibiting lower emotional health. Accordingly, we predict that the protective effects of healthy emotionality will go beyond what sense of control can provide alone.

Overview of the studies and research hypotheses

Against this background, we posited that healthy emotionality, as operationalized by Davidson (Davidson & Begley, 2012; Kesebir et al., 2019), would be a candidate for a protective resource in the face of adverse economic conditions. In two studies, we tested the hypothesis that healthy emotionality moderates the relationship between economic status, measured as income, and psychological well-being. Study 1 served as a foundational test of this hypothesis, allowing us to determine whether the expected interaction pattern would emerge using a streamlined set of measures and a general adult sample. This initial investigation also enabled us to evaluate the applicability of the Emotional Style Questionnaire (ESQ) in this context and provided insights that shaped the design and scope of Study 2. In turn, Study 2 expanded on these findings by using a larger and demographically representative sample, a more comprehensive assessment of income and well-being, and an additional test of whether healthy emotionality would moderate the relationship between income and well-being above and beyond the effect of a sense of control.

STUDY 1

The goal of Study 1 was to test whether healthy emotionality would buffer the adverse effects of low economic status on well-being. More precisely, we expected that individuals high in healthy emotionality would maintain higher well-being despite low economic status. We

operationalized economic status as household income, and measured well-being as a person's overall evaluation of their life and health.

Methods

Participants and recruitment

To calculate the minimum acceptable sample size, we assumed a weak income by healthy emotionality interaction ($\Delta R^2 = 3\%$). A priori power analyses using G*Power (Faul et al., 2007) showed that, given an alpha of .05 and a conventionally assumed power of .80, a sample of 256 would be required to detect a similarly sized effect. Factoring in potential exclusions due to attention checks, we recruited 275 U.S. adult participants on Amazon Mechanical Turk to complete an online survey in exchange for \$1. Participants were required to be at least 18 years of age to be eligible for the study.

We excluded 16 participants who failed to respond correctly to two attention checks,¹ resulting in a sample of 259 participants (116 women, 143 men; age 18–72, $M = 37.07$, $SD = 10.93$; employment status: 72.2% employed, 15.8% part-time employed, 12.0% unemployed; race/ethnicity: 80.3% White/Caucasian, 11.2% Black/African American, 8.1% Asian, 0.4% Native American). All study materials were in English.

Procedure and materials

After giving their informed consent, participants were asked demographic questions, including their overall annual household income. They responded to this question using a scale from 1 = “less than \$10,000” to 11 = “\$100,000 or higher”. Next, participants were asked to complete several blocks of questions as part of a larger data collection effort. Both the order of the blocks and the order of the questions within each block were randomized. One of these blocks consisted of the Emotional Style Questionnaire (Kesebir et al., 2019). ESQ is a 24-item self-report measure that captures how people vary across six dimensions that make up a healthy emotional life (see Table 1 for the ESQ dimensions and sample items). For each item, participants indicated their agreement on a Likert scale ranging from 1 = “Strongly Disagree” to 7 = “Strongly Agree”. The items were averaged to form a score of healthy emotionality ($\alpha = .91$, 95% CI [.89, .92])

The other study block consisted of two questions taken from Lachman and Weaver (1998). Participants rated their overall life at the present time on a 10-point scale ranging from 1 = “worst possible life you can imagine” to 10 = “best possible life you can imagine.” They also rated their present state of health on a 10-point scale from 1 = “worst possible state of health” to 10 = “best possible state of health.” The two items were used as indicators of a latent variable representing well-being.

Analytical approach

To verify our research hypotheses, we tested a model using structural equation modeling with MPlus (Muthén et al., 2017). Given that income and satisfaction with life and health were not

distributed normally (e.g., high kurtosis and skewness), we used the robust full information maximum likelihood estimation method to estimate the model. We examined goodness of fit using multiple indices: the root mean square error of approximation (RMSEA) and its 90% confidence interval (90% CI), the standardized root mean square residual (SRMR), the comparative fit index (CFI), and the Tucker Lewis index (TLI). We used multiple fit indices because they assess different types of model fit (e.g., model parsimony, absolute fit), and provide a more reliable, conservative evaluation when used together (Brown, 2015). The model was evaluated with criteria proposed by Hu and Bentler (1999). Accordingly, the lower bound for an acceptable fit for CFI and TLI was 0.90, while the upper bound for an acceptable fit for RMSEA and SRMR was .08.

Results and Discussion

Descriptive statistics and correlations between variables measured in Study 1 are presented in Table 2. Healthy emotionality was not correlated with income, while it correlated with well-being.

We tested whether healthy emotionality moderates the relationship between income and well-being. The model was well fitted to the data in light of all investigated indices (RMSEA = .00, 90% CI [0, .085], SRMR = .023, TLI = 1, CFI = 1). Higher levels of income and healthy emotionality were positively associated with higher well-being, while the interaction between these variables was significant and negative (see Table 3 and Figure 1).

Further decomposition of this interaction revealed that the effect of income on well-being was strongest for the lowest values of healthy emotionality ($M - 1SD = 4.07$), $b = 0.28$, $se = 0.06$, $Z = 4.60$, $p < .001$, weaker for the mean values ($M = 5.00$), $b = 0.13$, $se = 0.03$, $Z = 3.85$, $p < .001$, and non-significant for the highest values ($M + 1SD = 5.93$), $b = -0.01$, $se = .04$, $Z = -0.32$, $p = .748$. In other words, the negative well-being impact of low income was felt most strongly by participants with the lowest levels of healthy emotionality (Figure 2). This impact was somewhat weaker for participants with mean values of healthy emotionality, and non-existent for participants scoring highest on healthy emotionality.

As an auxiliary analysis, we fitted a similar structural equation model using the dimensions of healthy emotionality as moderators of the relationship between income and well-being (see Supplementary Materials for details). Higher levels of income ($b = 0.15$, $p < .001$) and Outlook ($b = 0.50$, $p < .001$) emerged as the only significant predictors of higher well-being, while none of the interaction terms reached significance. This suggests that no dimension of healthy emotionality is single-handedly responsible as a protective factor against low income.

TABLE 2 Descriptive statistics and correlations for variables measured in study 1 ($n = 259$).

Variable	<i>M</i>	<i>SD</i>	1	2	3
1. Income	5.96	2.80	-		
2. Healthy emotionality	5.00	0.93	.05	-	-
3. Satisfaction with life	6.81	1.85	.27***	.41***	-
4. Satisfaction with health	7.17	1.73	.14*	.37***	.56***

Note:

* $p < .05$, ** $p < .01$, *** $p < .001$.

TABLE 3 Summary of the SEM analyses for variables predicting well-being in study 1.

Model	<i>b</i>	<i>Se</i>	<i>Z</i>	<i>p</i>
<i>Measurement paths</i>				
Well-being → satisfaction with life	1	0	--	--
Well-being → satisfaction with health	0.83	0.12	7.22	.001
<i>Structural paths</i>				
Income → well-being	0.13	0.03	3.85	.001
Healthy emotionality → well-being	0.77	0.10	7.36	.001
Income x healthy emotionality → well-being	-0.16	0.04	-3.68	.001
<i>Covariances</i>				
Income ↔ healthy emotionality	-0.07	0.15	-0.50	.619

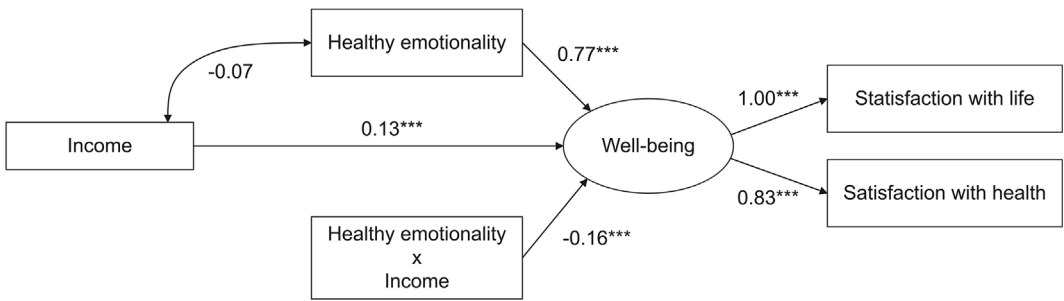


FIGURE 1 Structural equation model tested in study 1. Unstandardized path coefficients.

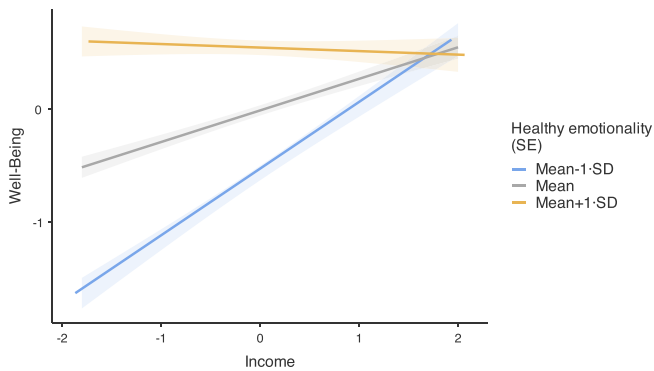


FIGURE 2 Well-being as a function of economic status and healthy emotionality (study 1). Shaded regions along the lines indicate standard errors. All variables are presented as Z-scores.

To summarize, we demonstrated that healthy emotionality moderated the effect of income on well-being: participants with a low income but a high level of healthy emotionality evaluated their life and health positively and similarly to those with higher incomes. When investigating separate dimensions of healthy emotionality, we did not find any moderation effect, and the only predictor of well-being was Outlook. This result might indicate the protective role of

healthy emotionality as a whole—and not its specific components—as a psychological resilience factor. However, as we noticed some multicollinearity between the dimensions of ESQ, this claim needs to be treated with caution.

STUDY 2

Study 1 provided initial support for our hypothesis that healthy emotionality mitigates the negative consequences of low economic status on well-being. In Study 2, we aimed to replicate and extend these findings by examining whether this effect also holds when sense of control is taken into account—a well-established psychological buffer against economic disadvantage. To increase the robustness of our results, we addressed two key limitations of Study 1: the narrow operationalization of income, based solely on individual earnings, and the narrow operationalization of well-being, measured only with single items assessing satisfaction with one's life and health. In Study 2, we enhanced the measurement approach by incorporating a broader range of income indicators—including personal, household, and per capita income—as well as a more comprehensive assessment of well-being, encompassing high levels of happiness, low levels of depressive symptoms, and low levels of physical symptoms. Additionally, we used a larger and more diverse U.S. sample. We tested our theoretical model that (1) healthy emotionality moderates the effects of income on well-being and (2) that healthy emotionality moderates the effects of income on well-being over and above the effects of sense of control.

Methods

Participants and recruitment

The sample size was calculated using a Monte Carlo power simulation with 1,000 repetitions in MPlus 8.10, based on the effects we found in Study 1. It revealed that, given an alpha of .05 and a power of .95, a sample of 241 participants would be required to detect a similarly sized interaction effect. Because in Study 2 we relied on a structural equation modeling with two latent variables representing income and well-being, and because we included two potential moderators (healthy emotionality and the sense of control), we quadrupled this number and aimed to recruit at least 964 participants.

We recruited 971 American participants via Prolific Academic to complete an online survey in exchange for 1.50 GBP. As intended, this sample was representative of the broader U.S. adult population concerning age, gender, and ethnicity (483 women, 481 men, 7 non-binary/third gender, age 18–90, $M = 44.59$, $SD = 16.03$; ethnicity 7.17% Asian, 13.41% Black, 3.95% mixed, 3.64% other, 71.83% White). All study materials were in English. We employed two attention checks,² and in line with our exclusion criteria, we excluded $n = 69$ observations, leaving a sample of $n = 902$ participants (462 women, 433 men, 7 non-binary/third gender, age $M = 44.86$, $SD = 16.14$).

Procedure and materials

After giving informed consent and indicating their age and gender, participants were asked three blocks of questions concerning their financial situation in randomized order. One block contained questions on their personal income per year (after tax) in GBP³ and on their overall annual household income including all earners, using a scale from 1 = “less than £10,000” to

12 = “More than £150,000”, and a question on the number of household members (including themselves). Personal income, household income, and income per capita served as three indicators of a latent variable constituting objective financial situation ($\omega = .83$, 95% CI [.81, .85]). The remaining blocks consisted of a question measuring subjective socioeconomic status (Adler et al., 2000) and three questions measuring the perception of one’s financial situation (Gasiorowska, 2014). These data were collected for a different project and hence are not reported here.

Next, participants were asked to fill in five sets of questions in random order. One of these sets included healthy emotionality ($\alpha = .88$, 95% CI [.87, .89]), using the same measure as in Study 1. The next block included the Sense of Control scale (Lachman & Weaver, 1998), consisting of four items measuring personal mastery and eight items measuring perceived constraints (these items were reverse-coded) with answers provided on a seven-point scale, from 1 = “Strongly disagree” to 7 = “Strongly agree.” The items were averaged to create a measure of sense of control ($\alpha = .87$, 95% CI [.86, .89]).

The remaining blocks contained measures of various indicators of well-being, including happiness, depressive, and physical symptoms. We measured happiness with the Subjective Happiness Scale by Lyubomirsky and Lepper (1999). This scale consists of four items answered on a 7-point scale, such as “In general, I consider myself ...”, here from 1 = “not a very happy person” to 7 = “a very happy person” ($\alpha = .86$, 95% CI [.85, .88]). Depressive symptoms were measured with the 10-item CES-D-10 scale by Björngvinsson et al. (2013). This scale consists of items such as “I felt like everything I did was an effort” or “I felt hopeful about the future” (reverse coded), with the response scale ranging from 1 = “Rarely or none of the time (less than 1 day)” to 4 = “All of the time (5-7 days)” ($\alpha = .87$, 95% CI [.86, .88]). Finally, we measured physical health with the Cohen-Hoberman Inventory of Physical Symptoms (CHIPS, Cohen & Hoberman, 1983). Participants were given a list of physical symptoms (e.g., “constant fatigue”, “back pain”, “cold or cough”) and asked to indicate whether these symptoms have bothered or distressed them “during the past four weeks including today”. They used a four-point scale ranging from 1 (meaning that they have not been bothered by the problem) to 4 (meaning that the problem was an extreme bother) ($\alpha = .95$, 95% CI [.94, .95]). The scores for happiness, depressive symptoms, and physical symptoms were used as indicators of a latent variable constituting well-being ($\omega = .71$, 95% CI [.68, .73]).

Analytical approach

To verify our research hypotheses, we tested a moderated mediation model using structural equation analysis with MPlus (Muthén et al., 2017). In the first step, we tested a simple model in which we regressed income, healthy emotionality, and their interaction on well-being. In the second step, the sense of control was added as an alternative moderator.

As we tested models that include interaction between latent variables, we could not obtain fit statistics such as RMSEA, SRMR, CFI, or TLI. These are available only for models where means, variances, and covariances are sufficient statistics for model estimation (Maslowsky et al., 2015; Muthén et al., 2017). The latent interaction term does not have a mean, variance, or covariance with other parameters, and thus should not affect the fit of the measurement model. Given this, we used a two-step method to assess each model’s fit (A. G. Klein & Muthén, 2007; Maslowsky et al., 2015). First, we calculated the RMSEA, SRMR, CFI, and TLI values obtained from the null model (where the interaction is assumed to be zero). Second, using a log-likelihood ratio test, we compared the relative fit of the null model and the alternative model (where the interaction is estimated). This test determines whether the more parsimonious null

model represents a significant loss in fit relative to the more complex alternative model (Satorra, 2000; Satorra & Bentler, 2010). If the null model fits well and, per the log-likelihood ratio test, the null model represents a significant loss in fit relative to the alternative model, then we can conclude that the alternative model is also well-fitted. If the log-likelihood ratio test is not significant, one can only conclude that the null model does not result in a significant loss of fit relative to the alternative model, while it remains unknown whether the fit of the alternative model is equal to or worse than that of the null model (Maslowsky et al., 2015).

Results and discussion

Descriptive statistics and correlations between variables measured in Study 2 are presented in Table 4.

To verify our research hypotheses, we tested a moderated mediation model using structural equation analysis with MPlus (Muthén et al., 2017). The fit for the null model at Step 1 was acceptable in light of most indices, RMSEA = .075, 90% CI [.058, .093], SRMR = .030, TLI = .976, CFI = .953. The log-likelihood ratio based on Sattora-Bentler scaled χ^2 revealed a significant loss of fit for the null model vs. the alternative model, $\chi^2(1) = 12.43$, $p < .001$, and the information criteria for the null model (AIC = 19310.89, BIC = 19426.20) indicated worse fit for the model including interaction (AIC = 19302.51, BIC = 19422.62). Therefore, we conclude that the model with the interaction between income and healthy emotionality tested at Step 1 fitted the data significantly better than the null model. Accordingly, the effects of income and healthy emotionality on well-being were significant and positive, while their interaction was significant (see Step 1 in Table 5 and Figure 3).

Further decomposing the interaction with simple slopes analysis revealed that the effect of income on well-being was strongest for the lowest values of healthy emotionality ($M - 1SD = 3.96$), $b = 0.14$, $se = 0.02$, $Z = 7.91$, $p < .001$, 95% CI [0.11, 0.17], weaker for the mean values of the moderator ($M = 4.80$), $b = 0.10$, $se = 0.01$, $Z = 8.65$, $p < .001$, 95% CI [0.08, 0.13], and the weakest but still significant for the highest values ($M + 1SD = 5.65$), $b = 0.07$, $se = 0.01$, $Z = 5.12$, $p < .001$, 95% CI [0.04, 0.10]. Again, the negative impact of low income on well-being was felt most strongly by participants with the lowest levels of healthy emotionality, and weakened for participants with higher values of healthy emotionality (see Figure 4).

TABLE 4 Descriptive statistics and correlations for variables measured in study 2 ($n = 902$).

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Personal income	4.79	3.40	—						
2. Household income	6.67	3.46	.68***	—					
3. Income per capita	2.74	1.81	.49***	.55***	—				
4. Healthy emotionality	4.80	0.84	.05	.09**	.08*	—			
5. Sense of control	4.77	1.03	.07*	.14***	.13***	.58***	—		
6. Depressive symptoms	2.01	0.66	-.17***	-.21***	-.16***	-.66***	-.57***	—	
7. Physical symptoms	1.57	0.53	-.02	-.08*	-.13***	-.43***	-.41***	.61***	—
8. Happiness	4.70	1.37	.25***	.25***	.13***	.60***	.48***	-.65***	-.29***

In the second step, we added the sense of control as another moderator of the relation between income and well-being to the path model we investigated at Step 1, allowing for a correlation between sense of control and healthy emotionality. The null model at Step 2 (without any interactions) was well fitted to the data in light of most indices, RMSEA = .075, 90% CI [.060, .090], SRMR = .033, TLI = .968, CFI = .943, and the log-likelihood ratio test revealed significant loss of fit for the null model vs. the alternative model, $\chi^2(2) = 14.25$, $p < .001$. The information criteria for the null model (AIC = 21472.73, BIC = 21612.07) indicated a worse fit for the model including interaction (AIC = 21461.30, BIC = 21610.25). Therefore, we conclude that the model with interactions tested in Step 2 was also well-fitted to the data.

As in Step 1, the effects of income and healthy emotionality on well-being were significant. The effect of sense of control was also significant, while the income by a sense of control interaction was not. Most importantly, our hypothesized interaction between economic status and healthy emotionality on well-being remained significant (Step 2 in Table 5 and Figure 3). The effect of income on well-being was strongest for the lowest values of healthy emotionality ($M - 1SD = 3.96$), $b = 0.20$, $se = 0.06$, $Z = 3.32$, $p = .001$, 95% CI [0.08, 0.32], weaker for the mean values of the moderator ($M = 4.80$), $b = 0.17$, $se = 0.07$, $Z = 2.52$, $p = .012$, 95% CI [0.04, 0.30], and nonsignificant for the highest values ($M + 1SD = 5.93$), $b = 0.14$, $se = 0.08$, $Z = 1.84$, $p = .065$, 95% CI [-0.01, 0.29].

TABLE 5 Summary of the hierarchical regression analyses for variables predicting well-being in study 2.

Model	Step 1				Step 2			
	<i>b</i>	<i>Se</i>	<i>Z</i>	<i>p</i>	<i>b</i>	<i>Se</i>	<i>Z</i>	<i>p</i>
<i>Measurement paths</i>								
Income → personal income	1.00	---	---	---	1.00	---	---	---
Income → household income	1.14	0.05	21.34	.001	1.13	0.05	21.00	.001
Income → income per capita	0.42	0.03	16.53	.001	0.42	0.03	16.44	.001
Well-being → happiness	1.00	---	---	---	1.00	---	---	---
Well-being → depressive symptoms	-0.50	0.02	-24.76	.001	-0.51	0.02	-24.92	.001
Well-being → physical symptoms	-0.21	0.02	-10.78	.001	-0.23	0.02	-10.75	.001
<i>Structural paths</i>								
Income → well-being	0.31	0.06	4.99	.001	0.33	0.06	5.30	.001
Healthy emotionality → well-being	0.97	0.04	26.34	.001	0.76	0.05	16.65	.001
Income x healthy emotionality → well-being	-0.04	0.01	-3.56	.001	-0.03	0.02	-2.08	.037
Sense of control → well-being					0.29	0.03	8.44	.001
Sense of control x healthy emotionality → well-being					-0.02	0.01	-1.22	.221
<i>Covariances</i>								
Income ↔ healthy emotionality	0.21	0.09	2.48	.013	0.21	0.09	2.50	.012
Income ↔ sense of control					0.40	0.10	3.89	.001
Sense of control ↔ healthy emotionality					0.51	0.03	16.38	.001

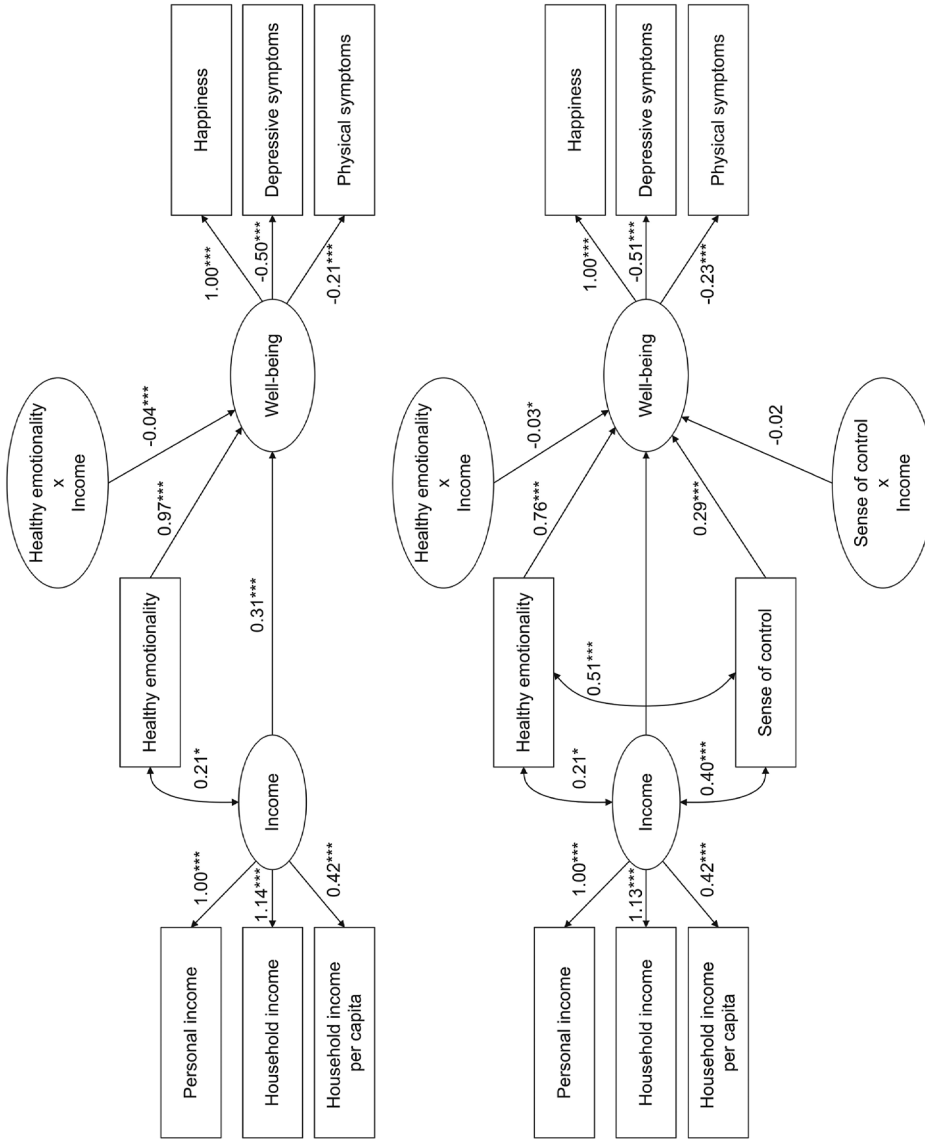


FIGURE 3 Structural equation model tested in study 2 at step 1 (upper panel) and step 2 (lower panel). Unstandardized path coefficients.

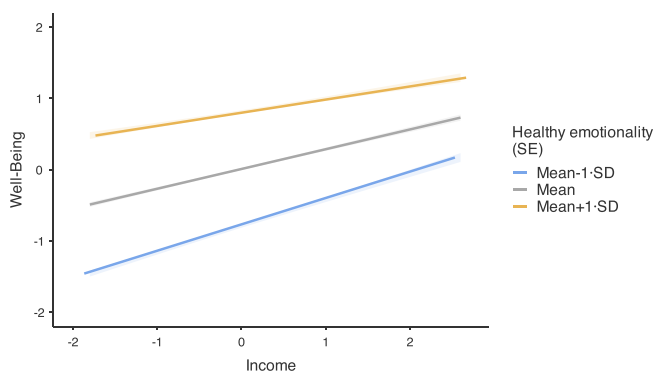


FIGURE 4 Well-being as a function of economic status and healthy emotionality (study 2). Shaded regions along the lines indicate standard errors. All variables are presented as Z-scores.

As an auxiliary analysis, we fitted a similar structural equation model using the dimensions of healthy emotionality as moderators of the relationship between income and well-being (see Supplementary Materials for details). Again, although well-being was significantly associated with Outlook ($b = 0.59$, $p < .001$), Resilience ($b = 0.13$, $p < .001$), Self-awareness ($b = 0.09$, $p < .001$), and Attention ($b = 0.08$, $p < .002$), no single dimension of healthy emotionality was responsible for buffering the detrimental effects of low income.

To summarize, we again observed a pattern where participants with low income but high levels of healthy emotionality were characterized by relatively high levels of happiness, together with low levels of depressive and physical symptoms—similar to the well-being of those who were well-off. Moreover, the interactional effect of the sense of control was not significant, and including it in the analysis did not alter the focal interaction. Study 2 thus provided empirical evidence that healthy emotionality buffers the negative well-being effects of low income above and beyond the effects of a sense of control.

DISCUSSION

In two studies, we showed that healthy emotionality has a buffering effect on the relationship between low economic status and well-being. In Study 1, we operationalized economic status as personal income and measured well-being as overall satisfaction with one's life and health. The results revealed that healthy emotionality moderates the association between income and well-being, in such a way that participants with low income but high levels of healthy emotionality rated their lives and health positively and similarly to participants with higher income. In Study 2, we recruited a larger and more diverse sample and used different operationalizations of economic status (i.e., as personal income, total household income, and household income per person) and of well-being (i.e., as feelings of happiness, low levels of depressive symptoms, and low prevalence of physical symptoms). Additionally, we measured sense of control and compared the protective role it plays in the face of low economic status to that of healthy emotionality. The findings from Study 1 regarding the moderating role of healthy emotionality were replicated in Study 2. The study also revealed that a sense of control plays a similar role, buffering the well-being consequences of low income. However, healthy emotionality emerged from our

analyses as a stronger buffer than a sense of control. As a whole, the studies make a number of contributions to the literature, on which we elaborate below.

Contributions and implications

First, our research replicated the previous finding that control beliefs serve as a buffer for the negative effects of low income on psychological well-being (Lachman & Weaver, 1998). Individuals with low economic status but a higher sense of control are happier, healthier, and exhibit fewer symptoms of depression than individuals of equal wealth but lower sense of control. A high sense of control among low-income earners is adaptive and protective, potentially because it provides the hope for solving one's problems and improving one's lot, thereby motivating greater activity and commitment to changing one's negative circumstances.

Second, we demonstrated how healthy emotionality protects against the negative psychological and physiological ramifications of low economic status. Healthy emotionality is defined as a general predisposition toward adaptive affective responses, and is almost by definition a vital personal resource for coping with adverse circumstances (Davidson & Begley, 2012; Kesebir et al., 2019). While it comprises six distinct dimensions—Outlook, Resilience, Social Intuition, Self-Awareness, Sensitivity to Context, and Attention—our findings show that none of these individual components alone significantly buffered the adverse effects of low income on well-being. Rather, it was the composite Healthy Emotionality score, capturing the integrated functioning of all six dimensions, that served this protective role. This suggests that while certain traits—particularly Outlook and, to some extent, Resilience—are consistently associated with higher well-being across individuals (see Kesebir et al., 2019), the capacity to withstand the psychological burden of economic disadvantage likely depends on a more comprehensive emotional health. The ability to sustain well-being under conditions of material scarcity may require the coordinated contribution of multiple emotional skills, rather than the presence of any single one.

Third, we have shown that healthy emotionality's protective effects go beyond those of a sense of control. Healthy emotionality and sense of control correlate moderately, which suggests that these two concepts overlap to some extent. However, when controlling for these two variables simultaneously, the effect of sense of control on well-being becomes weaker and even insignificant, suggesting that healthy emotionality plays a more fundamentally protective role than does sense of control. We explain this finding by the notion that healthy emotionality encompasses a sense of control within its scope, while a sense of control does not encompass the full breadth of healthy emotionality. It is easily conceivable that a person may feel considerable control over their life yet still exhibit poor emotional health in other domains (e.g., deficits in social intuition or self-awareness). This asymmetry suggests that healthy emotionality should provide broader protection than sense of control alone. While sense of control is an important psychological resource in coping with the challenges of economic adversity, it might better be regarded as part of a greater toolbox that is healthy emotionality.

Our results suggest that when governments, communities, and institutions invest in the cultivation of emotional health at the individual level, this can have a particularly beneficial effect on lower-income individuals' mental and physical health (Crone et al., 2023). This, in turn, could help them live more fulfilling and productive lives. That said, our results should not be interpreted as suggesting that enhancing emotional skills alone is sufficient to alleviate the individual and societal burdens of poverty. There are structural and systemic factors beyond the control of an individual that contribute to poverty, as well as to poor mental health. Addressing

those underlying factors with policies and programs should be no less a priority for governments and communities as targeting individual mental health.

Limitation and further research

While our research provides compelling evidence that healthy emotionality acts as a buffer against the negative effects of low economic status on well-being, it is not free from limitations. One such limitation is that we only used self-reported data. Although this might be satisfactory for assessing some variables (Chan, 2008), such as subjective happiness, in the case of mental health (e.g., depressive symptoms) and somatic health, research could benefit from also including objective or external measures (e.g., Uher et al., 2012).

Second, although the reported income range in our study is relatively large, it is nevertheless truncated at both ends. In particular, with regard to our conclusions about low-income individuals, it is important to emphasize that our sample did not include those with the greatest deprivation. The fact that we recruited an online sample effectively hindered this possibility. The question of whether healthy emotionality can be protective in extreme poverty, when people are unable to meet even their most basic needs, remains unanswered. Furthermore, our primary models assume linear relationships between income, healthy emotionality, and well-being, which may oversimplify the complexity of these relationships. While this approach is consistent with much of the previous research on moderators of the relationship between income and well-being (e.g., Gasiorowska, 2014, 2015), it does not fully account for possible curvilinear effects. Some studies show linear relationships between income and various well-being indicators (e.g., Diener et al., 2010; Howell et al., 2013; Killingsworth, 2021; Killingsworth et al., 2023; Martikainen et al., 2001), while others point to diminishing returns at higher income (e.g., Der, 2001; Kahneman & Deaton, 2010; Mackenbach et al., 2005). However, because our data contained relatively few participants with very high or very low income, it reduced the power to detect curvilinear patterns with confidence. Future research with a more balanced income representation should continue to investigate possible non-linear dynamics, particularly at these income extremes.

Finally, our data are cross-sectional, and we operated from the assumption that income, healthy emotionality, and sense of control are predictors of well-being. This exemplifies a “bottom-up” approach, according to which general life satisfaction is the sum of partial satisfactions with various aspects of one's life, and happiness is a function of individual need satisfaction (Veenhoven, 1994, 1996). However, an alternative “top-down” approach posits that the happier people are, the greater their satisfaction with certain aspects of life or even their performance in those aspects (Maison, 2019). Consistent with such an approach, we cannot rule out the possibility that well-being impacts feelings of control and economic status (e.g., Diener et al., 2002; Graham et al., 2004). Future research should consider alternative models regarding the causal relationship between our variables of interest. Longitudinal research would be helpful in deepening our understanding of the dynamic role of sense of control and healthy emotionality. Moreover, change in emotional style is within reach of therapeutic interventions (Davidson & Begley, 2012; Yan et al., 2022), as is change in a person's sense of control (Rodin, 1989; Thompson et al., 1993; Thompson & Spacapan, 1991). Thus, we see a particular need for studies that examine possible corrective interventions to break the link between low income and its negative well-being ramifications.

AUTHOR CONTRIBUTIONS

Agata Gasiorowska: conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing–original draft, writing–review and editing, visualization, supervision, project administration, funding acquisition. **Kaja Glomb:** conceptualization, writing–original draft, writing–review and editing. **Pelin Kesebir:** conceptualization, investigation, writing–original draft, writing–review and editing. **Richard Davidson:** conceptualization, writing–original draft, writing–review and editing.

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CONFLICT OF INTEREST STATEMENT

Authors declare no conflict of interests.

DATA AVAILABILITY STATEMENT

All study materials, datafiles, codebooks, analysis codes, and outputs are available at <https://researchbox.org/1957>.

ETHICS STATEMENT

The studies were approved by the Ethics Committee of the Faculty of Psychology in Wrocław, SWPS University.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the authors used Claude, Instatext and Grammarly to improve language and readability. After using these tools/services, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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ENDNOTES

- ¹ The first attention check was an open-ended question in the demographics section: “Please enter the year in which we are currently living” (16 cases excluded). The second attention check was: “Please choose the response strongly agree for this item” (8 cases excluded, all of which had also failed the first attention check).
- ² The first attention check was an open-ended question in the demographics section: “Enter today’s date as YYYY-MM-DD” (43 cases excluded). The second attention check was: “Please answer ‘strongly agree’ to this question” (29 cases excluded, 3 of which had also failed the first attention check).
- ³ Although the participants were from the U.S., the question used GBP as the currency, given that the study was conducted on Prolific Academic, a British platform.

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