

Objective Measurements of Well-being

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The study of subjective well-being has traditionally relied on psychological scales and correlation analyses. In this research, we introduce two perceptual tasks to investigate potential components that may impact subjective well-being: emotional detection and emotion lateralization. The first experiment utilized the discontinuous flash suppression paradigm to explore the relationship between unconscious emotion detection and well-being. Our results indicate that women with a greater capacity for detecting unconscious emotions are more likely to have positive emotions, stronger relationships, and higher levels of well-being than men. The second experiment, using the bi-stable paradigm, investigated the relationship between emotional lateralization and well-being. Our findings revealed that individuals with greater inter-hemispheric connections coped better with stress, had closer positive relationships, greater personal growth, and overall higher levels of well-being. This research attempts to identify "perceptual correlates" of well-being. To assess subjective well-being objectively and without bias, the relevant results will be further developed into a stable behavioral measurement.

Keyword: *behavior measurement, emotion, experimental paradigm, well-being*

Extended Abstract

Contemporary discussion of well-being can be broadly categorized into subjective or objective approaches to well-being based on the method used to measure happiness. Subjective measures of well-being emphasize personal experience and a sense of achievement, in which the individual's subjective judgment determines the level of well-being. Objective measures of well-being, in contrast, define well-being in terms of quality-of-life indicators such as material resources (income, food, and housing) and social attributes (education, health, political voice, social networks, and connections) (Western & Tomaszewski, 2016). Overall, subjective measures of well-being typically examine various related factors through correlation analysis, whereas objective measures focus more on theoretical construction and aim to determine which indicators should be included in the well-being model.

Physiological Experiments and Well-being

Research on well-being has been criticized for over-reliance on self-reports, which are potentially biased. Researchers in the field of well-being science have therefore attempted to measure well-being using brain and physiological responses in addition to self-report scales. Because a wide range of cognitive processes influence well-being, most studies have adopted a reductionist approach that reduces well-being to specific cognitive functions (e.g., emotion, anxiety, depression, and rewards). With this strategy, researchers have developed various tasks to measure physical responses to well-being objectively, thereby minimizing the personal bias associated with self-reports that may influence the findings. Among the various cognitive functions, emotion is one of the most influential factors affecting well-being.

More recently, the incorporation of functional magnetic resonance imaging (fMRI) with various emotional tasks has demonstrated that emotional processing is closely associated with well-being (see

relationship between unconscious emotional detection and well-being.

A recent study by Feng et al. (2022a, submitted) using the d-CFS paradigm demonstrated that the detection of invisible facial expressions may be associated with well-being. Furthermore, the association was gender-specific when the researchers controlled for other psychological states such as resilience and the need to belong. More specifically, the study showed that compared with men, women with a greater capacity for detecting unconscious emotions were more likely to have positive emotions, strong relationships with others, and a higher level of well-being.

The Association between Emotional Lateralization and Well-being

In addition to the ability to detect emotions, we believe that the lateralization found with emotional perception may also relate to well-being. In fact, the lateralization of emotional processing has been used to predict responses to emotional stimuli and well-being (Dalton et al., 2002; Hsieh et al., 1999; Jackson & Burgess, 2000; Ochsner et al., 2002). Furthermore, the degree of information integration between the two hemispheres has been linked to the ability to detect facial emotions at an early stage (Frässle et al., 2016a). Thus, in a prior study, we explored whether connectivity between the two hemispheres is related to the level of well-being (Feng et al. 2022b, submitted). Our results showed that people with greater connections between the two hemispheres coped better with stress and had closer positive relationships, greater personal growth, and higher overall levels of well-being.

General Discussion

In summary, the aim of this article is to review cognitive experiments on well-being and explore behavioral paradigms that may objectively quantify levels of well-being. To avoid potential confounding variables, we use low-level visual perception paradigms as an auxiliary measure of well-being. The preliminary results show that the participants who were better at detecting

emotional faces (low-contrast visibility for perceiving emotional faces) scored higher on the well-being scale.

This result may be related to the role of emotional intelligence in well-being, given that the ability to detect emotion has always been considered an indicator of emotional intelligence (Emotional Intelligence, EI, Fischer et al., 2018). In fact, previous studies have demonstrated that individuals who possess high levels of emotional intelligence are healthier (Wickham et al., 2020), better able to handle stress (Slaski & Cartwright, 2002), more comfortable integrating into social networks (Zeidner & Olnick-Shemesh, 2010), and less susceptible to addiction and other harmful behaviors (Butler et al., 2020), and are therefore have higher well-being (Zeidner et al., 2012). More research is needed to examine the relationship between emotional intelligence and the ability to detect emotional information without being aware of it.

Our results, however, conflict with some previous findings. For instance, Yu and Li (2012) found that people with low levels of well-being were more sensitive to fear-related stimuli. This inconsistency may reflect differences in the paradigms used. Furthermore, well-being is influenced by several factors, and it is unclear whether a single or a limited number of factors can be used to objectively measure well-being. In addition, the results obtained in the abovementioned experiments cannot be used to infer causality. More factors should be included in future experiments to predict well-being and develop a causal model.

Apart from emotional detection, based on the phenomenon of emotional lateralization, we further explored the relationship between hemispheric connectivity and levels of well-being. Our preliminary results show that people with higher connectivity between the two sides of the brain have higher levels of well-being in general. This result is consistent with previous findings. For instance, a study by Shahabi and Moghimi (2016) using EEG demonstrated a positive correlation between bilateral connectivity in the prefrontal cortex and emotional arousal. Additionally, the connection between the two hemispheres has been positively correlated with emotional understanding and emotional management

(Pisner et al., 2017). However, the origin and explanation of brain lateralization remain obscure. According to some studies, lateralization of the brain may result from unilateral dysfunction, in which the contralateral brain becomes dominant. In contrast, other studies suggest that lateralization results from the innate dominance of the unilateral brain (Aboitiz et al., 2003). To clarify the relationship between emotion and well-being, more research is needed on the causal relationship between emotional lateralization and well-being.

Finally, although there has been a call for the

objective examination of well-being, it remains unclear whether well-being measured with self-report scales and that measured with experimental tasks are the same. Further research is required to explore the relationship between well-being measured by self-report scales and that measured by behavioral/cognitive paradigms.

Acknowledgment

Professional English language editing support provided by AsiaEdit (asiaedit.com).