

THE EXAMINATION OF MULTIDIMENSIONAL PSYCHOLOGICAL FLEXIBILITY
INVENTORY: APPLICATION OF FACTOR ANALYSIS AND ITEM RESPONSE
THEORY

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Table of Contents

Table of Contents.....	i
List of Tables	ii
List of Figures	iii
Abstract.....	1
1. Introduction.....	3
1.1. Contextual Behavioral Science: Philosophical and Strategic Background.....	5
1.2. Extant Measures of Psychological Flexibility and Inflexibility	18
1.3. Critiques of Existing Measures of Psychological Flexibility and Inflexibility.....	35
1.4. Specific Aims of Dissertation	44
2. Study 1	46
2.1. Methods.....	46
2.2. Results.....	63
2.3. Interim Discussion for Study 1	83
3. Study 2	87
3.1. Methods.....	87
3.2. Results.....	93
3.3. Interim Discussion for Study 2	104
4. General Discussion	109
4.1. Factorial Structure.....	109
4.2. Item Functioning.....	112
4.3. Construct Validity	115
4.4. Racial Diversity	127
4.5. Practical Implications.....	129
4.6. Limitations and Future Directions	130
4.7. Conclusions.....	133

List of Tables

Table 1.1. Quality assessment of scales for psychological flexibility and inflexibility	151
Table 1.2. The list of R packages.....	152
Table 1.3. Overview of analytic procedures in the two phases	153
Table 2.1. Demographic background.....	154
Table 2.2. MPFI item descriptive statistics.....	155
Table 2.3. Parallel analysis and minimum average partial (MAP) test	159
Table 2.4. Standardized loadings (pattern matrix) based upon correlation matrix	160
Table 2.5. Measurement Invariance by gender and race	162
Table 2.6. Item parameters estimated by GPCM	163
Table 2.7. Correlations among MPFI factors.....	165
Table 2.8. Correlations between MPFI factor and related constructs.....	166
Table 2.9. Selection of Items	168
Table 3.1. Demographic background.....	171
Table 3.2. Item parameters of MPFI-S estimated by GPCM.....	172
Table 3.3. Correlations among MPFI-S factors	174
Table 3.4. Correlations between MPFI-S factors and related constructs.....	175

List of Figures

Figure 1.1. Conceptual representation of the model	178
Figure 2.1. Interitem correlation of 60 items in MPFI.....	179
Figure 2.2. Confirmatory factor analysis for 12-factor model.....	180
Figure 2.3. CFA for 12-factor model with two second-order factors	181
Figure 2.4. Item information curve of each factor in psychological flexibility.....	182
Figure 2.5. Item category characteristics curves of each factor in psychological flexibility.	183
Figure 2.6. Test information curves of each factor in psychological flexibility.....	184
Figure 2.7. Item information curves of each factor in psychological inflexibility	185
Figure 2.8. Item category characteristics curves of psychological inflexibility	186
Figure 2.9. Test information curves of each factor in psychological inflexibility.....	187
Figure 3.1. Confirmatory factor analysis of MPFI-S.....	188
Figure 3.2. Item information curve of psychological flexibility in MPFI-S.....	189
Figure 3.3. Item category characteristics curves of psychological flexibility in MPFI-S	190
Figure 3.4. Test information curves of psychological flexibility in MPFI-S.....	191
Figure 3.5. Item information curve of psychological inflexibility in MPFI-S.....	192
Figure 3.6. Item category characteristics curves of psychological inflexibility in MPFI-S ..	193
Figure 3.7. Test information curves of psychological inflexibility in MPFI-S	194
Figure 3.8. Factor mean comparisons between the original MPFI and MPFI-S	195
Figure 3.9. Bias index with absolute theta mean of the original MPFI and MPFI-S.....	196

Abstract

Background and Objective: The Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2018) is a recently developed self-report measure of psychological flexibility and psychological inflexibility. Using factor analyses and an item response theory (IRT) approach, my dissertation project aimed to examine and validate the MPFI with a racially and ethnically diverse sample of adults in Hawai‘i, and to develop and validate a new shorter-version of MPFI (MPFI-S).

Method: The present dissertation project consists of two phases (i.e., Study 1 and Study 2) with two convenience samples of racially diverse participants recruited from undergraduate psychology courses at the University of Hawai‘i at Mānoa. The first phase (Study 1: $n = 719$) had five specific foci. First, the factor structure of the MPFI was examined through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Second, following the framework of IRT, the functions of each item across purported trait levels were investigated. Third, the study assessed whether the original MPFI maintains measurement invariance at the structural level across gender and race/ethnicity groups. Fourth, preliminary validity evidence was gathered. Fifth and finally, a shorter version of the MPFI (i.e., MPFI-S) was preliminarily proposed by identifying three items for each dimension of psychological flexibility and psychological inflexibility, respectively. Following the completion of phase 1, Study 2 with another sample ($n = 698$) examined and psychometrically validated the short version of MPFI (MPFI-S). More specifically, the factor structure of MPFI-S was compared to that of MPFI derived from Study 1, and item functions were subsequently analyzed with the IRT application. Finally, the study preliminarily investigated the convergent validity as well as divergent validity of the specific domains of psychological flexibility and inflexibility measured by the MPFI-S.

Results: The findings of Study 1 support the factor structure of MPFI that was confirmed by the original MPFI psychometric study (Rolffs et al., 2018). More specifically, the factor structure found in Study 1 consisted of two higher-order factors, each having six respective first-order factors. Additionally, measurement invariance was found for gender and race/ethnicity categories, and IRT analysis indicated that most items demonstrated optimal functioning at the item level. Furthermore, generally, correlational findings supported the construct validity of MPFI scores. Finally, based on these findings and a review of item contents, a 36-item MPFI-S was preliminarily developed. Study 2 results revealed that the MPFI-S is a theoretically and psychometrically sound measure, which is comparable to the original MPFI. More specifically, Study 2 confirmed the presence of two higher-order factors in the MPFI-S, each having six corresponding first-order factors. IRT analyses also indicated that all items in the MPFI-S and their categories functioned optimally. Finally, correlational findings preliminarily supported the construct validity of MPFI-S scores at the first-order factor levels.

Discussion: With Hawai‘i-based samples of racially diverse college students, my dissertation project offers preliminary evidence of the MPFI and MPFI-S as psychometrically sound self-report measures of psychological flexibility and inflexibility.

Keywords: Multidimensional Psychological Flexibility Inventory, Psychological Flexibility, Psychological Inflexibility, Factor Analyses, Item Response Theory

1. Introduction

The constructs of psychological flexibility and psychological inflexibility have received increasing attention in the field of behavioral health for the past two decades (e.g., Barrado-Moreno et al., 2025). According to Hayes et al. (2006), psychological flexibility is the process of being aware of one's present-moment experience as a conscious human being and choosing behaviors in the service of personal values. Relatedly, psychological inflexibility is often referred to as a set of restricted or detrimental psychological and behavioral repertoires that individuals take in an attempt to control unwanted private events (e.g., thoughts, emotions, sensations), but at the expense of their valued goals.

To date, numerous self-report scales have been developed to measure psychological flexibility and inflexibility, and they have been used in various research and applied settings (Cherry et al., 2021). However, many of these measures, especially the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011), are subject to major psychometric and conceptual concerns. As discussed extensively below, these concerns include, but are not limited to, questionable construct validity (Wolgast, 2014) and unsatisfactory discriminant validity (Tyndall et al., 2019).

Commensurate with the concerns in measurement, the Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2018) was developed more recently to address some of these shortfalls. A review by Cherry et al. (2021) also suggested that the MPFI is one of the most sound measures of psychological flexibility and inflexibility both from a conceptual and psychometric standpoint. However, the MPFI can benefit from further investigations to examine and tailor its applied utility to today's more diversified society (Haynes et al., 2018; O'Donohue et al., 2022). These further examinations include: (a) measurement invariance at the structural level with a racially and ethnically diverse sample (Horn & McArdle, 1992), (b) adequate scaling (i.e., 6-point Likert scale; Edelen & Reeve,

2007), and (c) the development and validation of a short version of MPFI (Widaman et al., 2011) amenable to advanced statistical methods, such as path analysis using structural equation modeling (Blanca et al., 2018).

The aims of my dissertation were to examine the MPFI further in the above-mentioned domains with Hawai'i-based convenience samples of racially diverse college students. More specifically, my dissertation project consisted of two phases (two studies). In the first phase (Study 1; $n = 719$), factor structure of the MPFI was examined through exploratory factor analysis (EFA) and confirmatory factory analysis (CFA). Subsequently, following the framework of IRT, each item function was analyzed for its purported psychological flexibility and inflexibility level, followed by a preliminary investigation of measurement invariance as well as convergent and divergent validity based on examining relationships with other pertinent constructs. Finally, a novel shortened version of MPFI was preliminarily proposed by identifying three items for each dimension (i.e., first-order factor). For this purpose, an expert consultation was employed to ensure the content validity. In the second phase with another sample (Study 2; $n = 698$), this new shortened version of MPFI (MPFI-S) was psychometrically validated and finalized. More specifically, In Study 2, the factor structure of MPFI-S found in the Study 2 sample was compared to that of the MPFI found in Study 1, and then item functions were analyzed with the IRT application. Finally, the psychometric features of MPFI-S were compared with its original version and examined for its convergent and divergent validity.

In what follows, the strategic and philosophical basis of the present dissertation investigation are first presented, namely contextual behavioral science (CBS) and functional contextualism (Hayes, Barnes-Holmes, et al., 2012). Subsequently, the constructs of psychological flexibility and psychological inflexibility (Hayes, Barnes-Holmes, et al., 2012), constructs that the MPFI is designed to measure, were presented and discussed following the

philosophical framework of functional contextualism (Hayes, Strosahl, et al., 2012) as well as the psychometric framework (Haynes et al., 2018), which is commonly used in test development. Further, the extant self-report measures of psychological flexibility and inflexibility are outlined, along with the rationale for selecting the MPFI over other self-report instruments for further conceptual and psychometric investigation in my dissertation project.

1.1. Contextual Behavioral Science: Philosophical and Strategic Background

The constructs of psychological flexibility and inflexibility, the major topics of the present investigation, originated within contextual behavioral science (CBS; Hayes, Barnes-Holmes, et al., 2012), a research paradigm that underlies the development of third-wave cognitive behavior therapies (CBTs) and process-based CBTs (Hofmann & Hayes, 2019).

According to Hayes, Strosahl, et al. (2012), CBS is:

... a principle-focused, communitarian strategy of reticulated scientific and practical development. Grounded in contextualistic philosophical assumptions, and nested within multi-dimensional, multi-level evolution science as a contextual view of life, it seeks the development of basic and applied scientific concepts and methods that are useful in predicting-and-influencing the contextually embedded actions of whole organisms, individually and in groups, with precision, scope, and depth; and extends that approach into knowledge development itself so as to create a behavioral science more adequate to the challenges of the human condition (p. 1).

Following this definition, CBS researchers and practitioners often construe psychological flexibility and inflexibility as *applied or middle-level scientific concepts, rather than basic scientific concepts*, which have been developed and revised with the explicitly stated purpose of being useful in understanding and predicting-and-influencing psychological phenomenon of interest (i.e., behavioral adaptation in which entire organisms,

both as individuals and in groups, adjust their actions within a given context) with precision and broader applicability (Barnes-Holmes et al., 2015; Hayes, Strosahl, et al., 2012). In the following section, the philosophical basis of CBS and functional contextualism are briefly presented to better explicate the concepts of psychological flexibility and inflexibility.

1.1.1. Functional Contextualism

As highlighted in the above-mentioned definition, CBS is rooted in a contextualistic philosophy of science called functional contextualism (Hayes, Barnes-Holmes, et al., 2012). Although a detailed account of functional contextualism is beyond the scope of my dissertation project, worth addressing are some of its key philosophical assumptions, which explicate the criteria to which the concepts studied in CBS, such as psychological flexibility and psychological inflexibility, are developed, refined, and evaluated (Hayes, Long, et al., 2013). First, the goal of functional contextualism and a CBS approach is “the development of an organized system of empirically-based concepts/theories and methods that allow us to *predict-and-influence* behavioral phenomena of interest with precision, scope, and depth” (Biglan & Hayes, 1996, p.50). More specifically, using a *functional and contextual* framework as an epistemological standpoint (Klepac et al., 2012), the *analytic goal* of functional contextualism and CBS is the *prediction-and-influence* of the contextually embedded actions of whole organisms, individually and in groups. In CBS-informed theory and treatment development, the concepts of psychological flexibility/inflexibility have been developed and refined with this analytic goal in mind (e.g., “the extent to which the concept of psychological flexibility accounts for optimal health and well-being”).

Second, for functional contextualism and CBS, the basic unit of analysis is predicated on the *act-in-context* (i.e., behavior of a whole person considered in light of both time and place; Hayes & Wilson, 1993). More specifically, in functional contextualism and CBS, *act-in-context* is a framework for understanding and making sense of any behavioral phenomena

of interest, including behavioral phenomena that are often referred to as psychological flexibility and psychological inflexibility. Particularly relevant to the topic of the current dissertation project, if one follows the epistemological framework of functional contextualism, psychological flexibility and inflexibility are understood as *an act (operant) of a whole person situated in one's own historical and situational context with a particular functional quality*. In other words, in CBS and functional contextualism, to achieve the analytic goal of prediction-and-influence, psychological flexibility and inflexibility are conceptualized as the streams of verbally-regulated behavioral repertoires of a whole person, which are developed, shaped, and regulated situationally and historically through learning processes like any other verbally-regulated operant (Vilardaga et al., 2009). As detailed below, it is important to note that, self-report instruments used in CBS research, including the MPFI, do not measure psychological flexibility/inflexibility as a contextual situated operant of a whole person directly (O'Donohue, 2023). Instead, from a CBS account, the scores of extant self-report measures of psychological flexibility/inflexibility represent *self-reported proxies* of behavioral repertoires that are often identified as the facets of psychological flexibility/inflexibility (Hayes, Barnes-Holmes, et al., 2012; Newsome et al., 2019).

Finally, the truth criterion of functional contextualism lies in workability, as opposed to ontological assumptions (Hughes, 2018). This is the third philosophical assumption of functional contextualism that CBS follows (Vilardaga et al., 2009). In regard to the veridical evaluation of one's analysis, ontological claims focus on the extent of correspondence between hypotheses/theories and the world (e.g., the extent to which a given theory represents or models the world, see also elemental realism; Hayes et al., 1988). Conversely, truth in functional contextualism is evaluated based on the extent to which generated theories and methods, including basic and applied concepts, fulfill the goal of prediction-and-influence of the targeted behavioral phenomenon (e.g., psychological flexibility/inflexibility

and their functional relations with other key psychological phenomena) – essentially, *what is true is what is working* (Hayes, 1993). Thus, with an eye toward past contingencies and current environmental influences, the functional contextualist regards that, as long as a given theoretical model (e.g., psychological flexibility model) effectively predicts-and-influences the events of interest, it meets the truth criterion of functional contextualism. In other words, in CBS and functional contextualism, the truth of psychological flexibility/inflexibility is examined and evaluated based on the extent to which it helps achieve the above-mentioned pragmatic goals. In sum, in CBS, since its inception, the concepts of psychological flexibility and inflexibility were designed to reflect these pragmatic, functional, and contextual features (Hayes et al., 2007).

1.1.2. Psychological Flexibility and Inflexibility as Middle-Level Applied Terms

In CBS, psychological flexibility and psychological inflexibility are applied middle-level concepts, not basic scientific concepts or applied treatment methods (Hayes, Barnes-Holmes, et al., 2012). The ultimate aims of CBS within the domain of clinical psychological science are the alleviation of human suffering and the promotion of the prosperity of people (Hayes, Long, et al., 2013). As described above, in CBS, psychological flexibility and inflexibility are *applied scientific concepts* or *middle-level terms* constructed specifically to strive toward pragmatic outcomes (Vilardaga et al., 2009). That is, they are situated pragmatically between basic scientific concepts (i.e., relational framing, rule-governed behavior, verbal operant; Hayes et al., 2001) and applied treatment technologies (e.g., third-wave CBTs, Acceptance and Commitment Therapy; Hayes, Strosahl, et al., 2012). Unlike basic concepts in CBS, such as operant conditioning and transformation of stimulus function (Zettle et al., 2016), applied and middle-level concepts, such as psychological flexibility and inflexibility, themselves are not necessarily high in precision. However, the use of these concepts in research and practice facilitates the practicality and accessibility of theories and

applied interventions, that have been devised from more precise basic accounts (Hayes, Barnes-Holmes, et al., 2012) – that is, *they are pragmatic in helping researchers, clinicians, and clients work toward desired ends*. Similarly, psychological flexibility and psychological inflexibility are not applied therapeutic methods (e.g., treatment techniques). Instead, they are often viewed as key processes of change targeted in interventions (Hofmann & Hayes, 2019). The conceptual representation of psychological flexibility and inflexibility is presented in Figure 1. With this in mind, the following outlines the CBS account of psychological flexibility/inflexibility.

1.1.3. Psychological Flexibility

Within CBS, the constructs of psychological flexibility and inflexibility originated from a series of clinical observations suggesting that suffering unique to humans often reflect unworkable attempts to persistently suppress and control unwanted self-narratives, thoughts, feelings at the expense of pursuing values-based living (Hayes et al., 1996). Simultaneously, these clinical observations were also said to suggest that psychological health and wellbeing are best characterized by the ongoing pursuit of valued ends while being open to whatever one is experiencing as it is in the present moment (Hofmann & Hayes, 2019; Wilson & Murrell, 2004).

Measuring behavioral processes of psychological flexibility and inflexibility is often challenging because of their dynamic, multidimensional, and functional-contextual nature (O'Donohue, 2023). Yet, researchers often operationalize psychological flexibility as “the process of contacting the present moment fully as a conscious human being and persisting or changing behavior in the service of chosen values” (Hayes et al., 2006, p.9). Along with Hayes et al.’s original conceptualization of psychological flexibility, Kashdan et al. (2020) more recently defined psychological flexibility as the ability to respond flexibly to situations in a way that facilitates the pursuit of one’s valued goal even in the presence of psychological

suffering. Moreover, according to Kashdan and Rottenberg (2010), people high in psychological flexibility tend to demonstrate a greater willingness to be open to uncomfortable feelings and thoughts if doing so reflects the pursuit of valued living.

Hayes et al. (2006) further explicated that, at an applied level, the process of psychological flexibility can be easily understood in terms of six core dimensions: (a) acceptance, (b) defusion, (c) self-as-context, (d) present moment awareness, (e) values, and (f) committed action. Because of its six dimensions, this model is also called the *Hexaflex* model of psychological flexibility (Hayes, Strosahl, et al., 2012). First, the dimension of *acceptance* can be defined as “the voluntary adoption of an intentionally open, receptive, flexible, and non-judgmental posture with respect to a moment-to-moment experience” (Hayes, Strosahl, et al., 2012). It refers to embracing private experiences (e.g., thoughts, feelings, perceptual experiences) as they are without making efforts to change the intensity and frequency of these private experiences. It can be described as a willingness and a choice to make contact with unwanted or distressing private experiences, or any situations that would trigger these negative experiences. It is an ongoing and voluntary process (i.e., an act of a whole person), rather than a technique or a state of being (Hayes, Strosahl, et al., 2012). In CBS research, the acceptance process (i.e., dimension of acceptance in psychological flexibility) has been reported to be related to an increased persistence and willingness to engage in distressing tasks (Levin et al., 2012).

Second, *cognitive defusion* refers to an individual’s ability to notice ongoing cognitive processes as separate phenomena from their topographical products (i.e., literal truth) with the goal of taking a step back from thoughts to witness them from the point of view of an observer (Gillanders et al., 2014). Simply put, cognitive defusion reflects a process of looking at a thought or other private events as mental phenomena rather than looking *through* them. Conceptually, cognitive defusion is theorized to reduce the automatic effects of verbal

knowledge on behavior by incorporating more flexibility in how one relates to thoughts (Assaz et al., 2023; Hayes, Strosahl, et al., 2012). In other words, it attempts to alter the way a person interacts with thoughts in order to reduce the literal and behavior-regulatory quality of the thoughts (Hayes et al., 2006). Empirical findings suggest that defusion strategies targeting the detachment from negative self-referential thoughts were related to the reduction of the discomfort and the believability associated with these thoughts (Masuda et al., 2004; Masuda et al., 2009).

Third, *self-as-context* refers to the self as a perspective from which one's personal experiences, such as thoughts and emotions, are perceived (Hayes, Strosahl, et al., 2012). This experience of self as an act of a whole person can be described as an individual's ability to observe the continuous flow of experience (i.e., self as an ongoing process), rather than rigid and inflexible attachment to their self-narrative that can narrow behavioral repertoires and distort the appraisal of events which are inconsistent with the self-conceptualization (Hayes, 1984). Although the empirical evidence is still limited for self-as-context as a stand-alone process within CBS-based psychosocial interventions (Zettle et al., 2018), such as ACT, this process has been reported to be positively correlated with wellbeing and inversely correlated with psychological distress (Godbee & Kangas, 2020).

Fourth, *present-moment awareness* refers to the intentional allocation of attention towards the ongoing physical and psychological experience (Hayes, Strosahl, et al., 2012). This construct emphasizes the extent to which an individual is disentangled from cognitive narratives surrounding the "past" or "future" by worrying, anxiously predicting, or ruminating. The level of flexible attentional shifting (e.g., persist or change as needed) is also regarded as one of the defining characteristics of this process (Crane et al., 2017). In CBS-informed practices, such as ACT, clients are encouraged to cultivate non-judgmental contact with their private experiences for aligning their behaviors more consistently with the values

they hold (Hayes et al., 2006). To date, present-moment awareness has been found to serve as a protective factor for a range of mental and behavioral concerns, such as daily stress and eating disorder behaviors (Donald et al., 2016; Jo & Yang, 2019).

Fifth, *values* refers to the construction or clarification of the direction or choice of life that an individual truly desires (Reilly et al., 2019). According to Hayes et al. (2006), this process is related to, yet distinct from, goals, which are immediately achievable outcomes, steps, or points one can reach (e.g., doing volunteer works in the community) in the pursuit of values (e.g., sharing and helping others). In other words, values are “chosen qualities of purposive action that can never be obtained as an object but can be instantiated moment by moment” (Hayes et al., 2006, p.9). Identification of, and behavioral alignment with, one’s values have been found to be related to improved quality of life, empowering individuals to initiate and sustain desired change (Barrett et al., 2019).

Lastly, *committed action* refers to the level of persistence or the extent to which a person carries out particular behaviors consistent with pre-determined values and goals (Hayes, Strosahl, et al., 2012). Essentially, it is the act of putting a value into concrete actions so that one can consistently commit to behavioral goals after a given value has been clarified. Committed action is also said to be the most prominent treatment process that signifies the link between ACT and conventional behavior therapies (Trompetter et al., 2013), and “almost any behaviorally coherent behavior change method can be fitted into [this process]” (Hayes et al., 2006, p.9). Extant literature has reported that value-based activities were related to increased functioning among a range of psychiatric patients, including those with panic disorder (McCracken, 2013; Wersebe et al., 2017).

On a related note, these six processes are often categorized into three broad behavioral repertoires; open (acceptance and defusion), centered (present moment awareness and self-as-context), and engaged (values and committed action) response styles (Hayes et al., 2011). In

fact, as discussed in detail below, some existing measures of psychological flexibility, such as the *Comprehensive Assessment of Acceptance and Commitment Therapy Processes* (CompACT; Francis et al., 2016), follow this tripartite framework of psychological flexibility.

Today, there is a large body of evidence showing the positive association of psychological flexibility with a range of salutary psychological constructs, including life satisfaction (Lucas & Moore, 2020), self-efficacy (Jeffords et al., 2020), resilience (Bryan et al., 2015; Jo, Pyo, et al., 2024), and well-being (Marshall & Brockman, 2016). In contrast, psychological inflexibility has been negatively associated with various adverse psychological outcomes, including depression, anxiety, and excessive worry (Levin et al., 2014).

The benefits of psychological flexibility are further evidenced for individuals with depression (Fonseca et al., 2020; Jo, Yang, et al., 2024), anxiety (Bluett et al., 2014), post-traumatic stress disorder (Richardson & Jost, 2019), chronic pain (Gentili et al., 2019), and general psychological distress (Masuda & Tully, 2012). Furthermore, several meta-analyses and systematic reviews concluded that ACT, which targets psychological flexibility as a mechanism of salutary change, is more effective than a waitlist-control, and at least equivalent to cognitive behavioral approaches in improving patient outcomes (A-tjak et al., 2015; Gloster et al., 2020). Interestingly, psychological flexibility has also been found as a major change process in other evidence-based treatment procedures, such as traditional cognitive behavioral interventions (Lloyd et al., 2013; Schubert et al., 2022; Yasinski et al., 2020).

1.1.4. Psychological Inflexibility

While psychological *flexibility* is theorized to be at the core of psychological health and well-being, most research on psychological flexibility has actually been focused on the relationship between psychological *inflexibility* and psychopathology. As discussed

extensively elsewhere (Doorley et al., 2020; Rolffs et al., 2018), this research trend is based on the assumption that the absence of psychological inflexibility is equivalent to greater psychological flexibility. As described above, in the CBS literature, psychological inflexibility refers to restricted psychological and behavioral repertoires that individuals employ to excessively control (e.g., minimize, avoid) unwanted private events, which in turn interferes with value-directed adaptive behavioral repertoires (Hayes, Strosahl, et al., 2012).

Similar to psychological flexibility, CBS researchers study psychological inflexibility in terms of six core dimensions, which correspond to those of psychological flexibility (Hayes, Strosahl, et al., 2012; Rolffs et al., 2018). These six dimensions of psychological inflexibility are (a) experiential avoidance, (b) cognitive fusion, (c) self-as-content, (d) lack of contact with the present moment, (e) lack of contact with values, and (f) inaction.

First, *experiential avoidance* refers to an aspect of psychological inflexibility that can be observed when a person is unwilling to remain in contact with particular private experiences (e.g., thoughts, emotions, memories, sensations, etc.) and attempts to manipulate the form or frequency of these events and the contexts associated with them (Boulanger et al., 2010; Hayes et al., 1996; Kashdan et al., 2006). According to Hayes et al. (1996), language-able individuals are often influenced by an overextension of the problem-solving and evaluative functions of cognition and negatively assess their private experiences. This avoidance tendency can be strengthened by negative reinforcement even if the behaviors are adaptive and value-consistent (Hayes, Levin, et al., 2013).

Second, *cognitive fusion* refers to verbal dominance over behavioral responding to the extent that other sources of stimulus controls (e.g., environmental context) do not influence behavior (Hayes, Levin, et al., 2013). In other words, it is a state when an individual's behavior is overly regulated and influenced by cognitive processes as they take their thoughts very literally and do not consider other important environmental factors that could influence

their behavior (Bodenlos et al., 2020). When individuals behave based on tightly-held beliefs, it can restrict their behavioral choices in a manner that is detrimental and maladaptive. For example, an individual may have a reoccurring thought accompanied by negative emotion, “I am fat.” If the individual is dominated by this verbal content, the individual may engage in avoidance strategies to attenuate it (Hayes, Levin, et al., 2013; Masuda et al., 2004).

Third, *self-as-content*, also referred to as the conceptualized self, means that an individual’s behavior is dominated by certain conceptualizations of the self (Hayes, Strosahl, et al., 2012; Zettle, 2016). People may have positive or negative conceptualizations about themselves according to their life experiences. Evaluations and behaviors based on one’s history, strengths, and weaknesses can be adaptive in many social contexts. However, it becomes problematic when the self-conceptualization rigidly adheres to the extent where one’s adaptive behavioral repertoires are narrowed (Hayes, Levin, et al., 2013). For example, an individual may strongly identify oneself with personal narratives such as objective facts (e.g., age, nationality), personal attributes (e.g., preference, personality), and social roles (e.g., parents), and maladaptively restrict their behaviors within situations to make them congruous with the self-concept.

Fourth, *lack of contact with the present moment* refers to a failure of being aware of current internal and external stimuli, compounded by attentional rigidity. Attentional rigidity occurs when an individual narrows one’s attention by fixating on a particular topic and has difficulty shifting attention and responding to ongoing experiences (Hayes, Strosahl, et al., 2012). Conceptually, loss of flexible contact with the present moment is theorized to decrease individuals’ willingness to come into contact with unwanted internal experiences and to adaptively broaden the variety of behaviors one can select in a given moment (Hayes, Levin, et al., 2013; Hayes, Strosahl, et al., 2012). Some theorists also note that this process can be

manifested in three forms; difficulties in focusing on the present moment, prolonged periods of mind-wandering, and difficulties in awareness of mind-wandering (Scheibner et al., 2016).

Fifth, *lack of contact with values* means that an individual is unclear about, neglecting, or acting inconsistently with core values, which are principles or standards of behavior (Hayes, Strosahl, et al., 2012; Wilson & Murrell, 2004). Values can be defined as “chosen, verbally constructed consequences of dynamic, evolving patterns of activity for which the predominant reinforcer becomes intrinsic to the behavioral pattern itself” (Hayes, Levin, et al., 2013, p.186). Difficulty in the domain of values often involves a lack of clarity regarding what one’s values are. As an example, compliance-based values involve the intent to avoid social criticism or achieve social approval and do not facilitate a sense of meaning or purpose (Hayes, Levin, et al., 2013).

Finally, *inaction* is a dimension of psychological inflexibility, which is often referred to as failing to effectively persist when continued action is needed in order to achieve value-based goals (Hayes, Strosahl, et al., 2012). In other words, inaction in the framework of psychological inflexibility is a lack of engagement with opportunities that are meaningful for an individual to live a vital life. This can manifest in the absence of the introduction of a desirable or pleasant stimulus after a behavior (i.e., making contact with positively reinforcing contingencies of values-based behavior). The desirable stimulus reinforces the behavior, making it more likely to reoccur. Repertoires predicated on positive reinforcement cannot be built if one does not take action aligned with their personal goals and values (Hayes, Levin, et al., 2013).

To date, psychological inflexibility has been found to be positively associated with a range of mental health concerns, such as depression (Gilbert et al., 2019), anxiety (Tavakoli et al., 2019), pain (Feinstein et al., 2011), stress (Eisenbeck et al., 2019), and eating disorders (Jo, Goh, et al., 2024; Morton et al., 2020). It also presented a negative association with

resilience factors such as mindfulness (Latzman & Masuda, 2013). Furthermore, a large study with college students reported that the transdiagnostic feature of psychological inflexibility may increase the risk for multiple psychiatric disorders (Levin et al., 2014).

1.1.5. Psychological Flexibility and Psychological Inflexibility as a Whole

In extant literature, psychological flexibility and psychological inflexibility are often understood as concepts at the two extremes of a single continuum or as the two classes of operants that are incompatible with each other (Bond et al., 2011; Hayes et al., 2007; Kashdan et al., 2020). More specifically, as presented above, a given facet of psychological flexibility is associated with its corresponding facet of psychological inflexibility (e.g., acceptance in psychological flexibility and experiential avoidance in psychological inflexibility) as if they are on the same functional dimension (e.g., greater acceptance implies lower experiential avoidance).

However, recent studies have suggested that psychological flexibility and psychological inflexibility may actually be best understood as two related, yet distinct constructs or classes of operants that may coexist (Cherry et al., 2021; Rogge et al., 2019). For example, in a sample of undergraduate students in a Canadian university ($n_{\text{study1}} = 315$ and $n_{\text{study2}} = 345$), Howell and Demuyneck (2021) reported that psychological flexibility and psychological inflexibility, which were measured by the MPFI (Rolffs et al., 2018), were *independently* associated with well-being. Additionally, another study with a nationally representative American sample ($n = 7,884$) reported that some individuals showed both greater psychological flexibility and greater psychological inflexibility simultaneously (Ciarrochi et al., 2014). Finally, Stabbe et al. (2019) suggested that psychological flexibility and psychological inflexibility, measured by the MPFI (Rolffs et al., 2018), were qualitatively distinct from each other because each predicted different outcomes, in which psychological inflexibility predicted clinical outcomes such as psychological distress whereas

psychological flexibility was more strongly associated with quality of life and well-being. As such, it may not be adequate to conceptualize psychological flexibility and psychological inflexibility as opposite extremes of single functional dimension or continuum and infer each other merely through the absence of the opposite (e.g., low experiential avoidance does not necessarily equate to high experiential acceptance). In other words, it is necessary to measure psychological flexibility and psychological inflexibility separately and appropriately to have a comprehensive CBS account of psychopathology and psychological health (Rolffs et al., 2018).

1.2. Extant Measures of Psychological Flexibility and Psychological Inflexibility

As articulated above, from the philosophical perspective of functional contextualism, psychological flexibility and psychological inflexibility are construed as classes of contextually situated behavioral patterns (i.e., verbal operants) with particular functional qualities. Methodologically, if psychological flexibility and inflexibility are conceptualized in this way, it is ideal to identify and measure them functionally and contextually via behavioral observation and self-monitoring that accounts for the functional and contextual aspects of behavioral repertoires of psychological flexibility/inflexibility (Newsome et al., 2019; O'Donohue, 2023). However, as briefly noted above, in research and practice both within and outside CBS, psychological flexibility and psychological inflexibility are measured primarily and often exclusively with self-report instruments (Arch et al., 2022).

Highlighting this gap between how psychological flexibility/inflexibility are conceptualized following the philosophical position of functional contextualism and how they are typically measured with self-report instruments is important. That is, such an examination allows for elucidation of potential discrepancies and incoherence at a philosophical level (O'Donohue, 2023). In particular, by measuring what are referred to as psychological flexibility and inflexibility using a self-report instrument, a majority of existing psychometric

studies of psychological flexibility and inflexibility adhere to the conventional hypothetico-deductive methodological paradigm (Vilardaga et al., 2009), which is guided by another philosophical worldview, often called mechanism or essential realism (Hughes, 2018; Klepac et al., 2012). In this philosophical worldview, self-report measures purport to assess latent constructs proposed to veritably exist within reality. Proposed latent constructs are presumed to be approximated by a particular set of behavioral indicators (i.e., response to items in the measure). Analytic truth is thus defined as the extent to which self-report measures approximate the latent entity as it exists (i.e., correspondence). In other words, when psychological flexibility and psychological inflexibility are measured by a self-report scale, researchers assume an ontological position, implicitly assuming psychological flexibility and psychological inflexibility to be latent traits or context-independent psychological entities more so than contextually situated classes of behavior (i.e., act-in-context), functionally speaking. For this reason, some critiques of CBS note that a self-report measure is not an adequate measurement method if psychological flexibility and psychological inflexibility are construed functionally and contextually as classes of verbal operants (O'Donohue, 2023).

Nevertheless, as the majority of empirical evidence of psychological flexibility and inflexibility have been built on psychometric methods (Newsome et al., 2019) and because the current dissertation project primarily focused on a psychometric investigation, psychological flexibility and psychological inflexibility were conceptualized as trait-like psychological events in the current dissertation project. Taking these considerations into account, in what follows a summary of existing self-report measures for psychological flexibility and inflexibility and their associated psychometric qualities are presented.

To date, there are numerous measures of psychological flexibility and psychological inflexibility with varying psychometric qualities which have been used in research and clinical settings (Ong, Lee, et al., 2019). In this section, I only focus on the self-report scales

that meet certain levels of psychometric qualities by adopting and expanding the quality criteria used in Cherry et al. (2021).

Cherry et al. (2021) conducted a narrative scoping review to examine the psychometric quality of commonly used measures of psychological flexibility and inflexibility. To do so, they employed several criteria to select the measures to be included in their review. For example, they considered *year* (i.e., studies published since 2004), *language* (i.e., studies published in English), *sample* (i.e., studies conducted with human participants aged between 13 to 64), and the *reference type* (i.e., peer-reviewed journal).

In Cherry et al. (2021), the screening process was conducted with three independent reviewers in which the inclusion and exclusion criteria were examined by reviewing the article titles and abstracts. Any discrepancies between the reviewers were resolved through discussion until a consensus was reached. Additionally, given the multi-faceted nature of psychological flexibility and inflexibility (Hayes et al., 2006), the review excluded measures that include only certain facets of psychological flexibility or psychological inflexibility, such as cognitive fusion (Cognitive Fusion Questionnaire; Gillanders et al., 2014) and value and committed action (Engaged Living Scale; Trompetter et al., 2013). Furthermore, scales measuring psychological flexibility and inflexibility confined to specific problem areas, such as body image (Body Image Acceptance and Action Questionnaire; Sandoz et al., 2013), were excluded from the review as well. As a result, Cherry et al. (2021) identified 12 measures of psychological flexibility, psychological inflexibility, and cognitive flexibility (see the discussion on the construct of cognitive flexibility below).

Once these scales were identified, Cherry et al. (2021) examined the quality of these measures using the assessment criteria informed by Terwee et al. (2007) and Strauss et al. (2016). These criteria included (a) content validity, (b) internal consistency, (c) discriminant validity, (d) test-retest reliability, (e) interpretability, and (f) definition/measure alignment. In

Cherry et al. (2021), each of the 12 scales was then evaluated for each of these criteria using a 3-point rating scale with 2 for being fully met with requirements, 1 for being partially satisfactory, and 0 for being unsatisfactory (i.e., the criterion is not met) or insufficient (i.e., sufficient information is not available).

As a brief review, *content validity* refers to the extent to which the construct of interest is comprehensively represented by the items in the scale. *Internal consistency* examines the extent to which items in a scale are homogeneous, thus measuring the same construct. *Discriminant validity* examines the extent to which a scale is not related to other scales that measure different concepts. Specifically, the authors granted the maximum score (i.e., 2) for the discriminant validity if the score of a scale is distinguishable from that of negative affect, neuroticism, and emotional disturbances (i.e., correlation(s) < 0.70; see the discussion below). Conversely, the minimum score (i.e., 0) was given for a scale if the score of that scale is not distinguishable from other constructs, particularly with negative affect, neuroticism, and emotional disturbance (i.e., correlation(s) ≥ 0.70). *Test-retest reliability* is a type of reliability that can be achieved by measuring construct at two distinct periods of time. *Interpretability* in this context refers to clinically relevant information on changes in symptoms or states that a scale can provide. Finally, for their review, the authors added the *definition/measure alignment* criterion to examine whether the conceptual definition of a construct in a given psychometric paper corresponded to the item content and scoring procedures of that measure.

For the current review in the context of the present dissertation, four scales (i.e., Cognitive Flexibility Scale, Cognitive Flexibility Inventory, Cognitive Control and Flexibility Questionnaire, and Psychological Flexibility Questionnaire) were excluded that were included in Cherry et al. (2021). This is because these four scales are designed to measure cognitive flexibility, a construct that emerged from the field of cognitive

neuroscience, or the construct of psychological flexibility that is not informed by the CBS account of psychological flexibility/inflexibility (Doorley et al., 2020). Furthermore, the Psy-Flex (Gloster et al., 2021), a more recently developed measure of psychological flexibility, was included in the review. This is because the original validation study for the Psy-Flex was not yet published when Cherry et al. was published, and with my own review, the Psy-Flex appeared to meet the inclusion criteria used for Cherry et al.'s scoping review.

Furthermore, for the present review, Cherry et al. (2021)'s quality criteria were expanded by including two additional criteria: (i) the Consensus-based Standards for the Selection of Health Status Measurement Instruments (COSMIN; Mokkink et al., 2010) and (ii) whether a scale measures the constructs of psychological flexibility and psychological inflexibility separately and multidimensionally. The COSMIN is a set of quality criteria that are specific to evaluating the methodological quality of IRT analysis. These criteria are: (a) description and appropriateness of the IRT model used, (b) use of software program, (c) estimation method, and (d) IRT assumptions. The last criterion was added to the present review to examine whether psychological flexibility, psychological inflexibility, or both measured by a given scale aligned with the current body of evidence in CBS research, as described above. That is, psychological flexibility and psychological inflexibility are theorized to be related and yet distinct multidimensional processes; therefore, they need to be measured separately. Table 1.1 shows the review of 9 prominent scales of psychological flexibility, psychological inflexibility, and both that met the above-mentioned inclusion criteria. Below is a summary description for each of the 9 scales, starting with the AAQ-II.

1.2.1. Acceptance and Action Questionnaire-II

The Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011) is a 7-item self-report questionnaire designed to measure psychological inflexibility or experiential avoidance. Today, the AAQ-II, a revised version of the original AAQ (Hayes et al., 2004), is

one of the most widely used measures of psychological flexibility/psychological inflexibility (Arch et al., 2022). The AAQ-II is a single-factor scale. Example items include “My painful experiences and memories make it difficult for me to live a life that I would value” and “Worries get in the way of my success.” All items are rated using a 7-point Likert scale, ranging from 1 (i.e., “never true”) to 7 (i.e., “always true”) with greater scores reflecting higher levels of psychological inflexibility or experiential avoidance. Cherry et al. (2021) reported that the AAQ-II has demonstrated evidence of good content validity, test-retest reliability, and internal consistency, whereas being partially satisfactory for interpretability, indicating that it provides limited information on the clinically relevant changes in psychological inflexibility.

Furthermore, Cherry et al. (2021) rated the AAQ-II as being questionable and unsatisfactory in the domains of discriminant validity and definition/measure alignment. Specifically, the unfavorable evaluation of discriminant validity was mainly because the score of AAQ-II is associated with psychological distress, negative emotions, and neuroticism more strongly than the facets of psychological flexibility/inflexibility, such as experiential avoidance (Bond et al., 2011; Rochefort et al., 2018; Wolgast, 2014). As such, it is unclear whether the AAQ-II actually measures psychological inflexibility as a purported change process explicated in the CBS theory or psychological distress as an outcome variable (Arch et al., 2022). Also, the authors argued that the measure’s alignment was not achieved since the AAQ-II is often used to infer the presence of psychological flexibility through the absence of psychological inflexibility, which is problematic both conceptually and empirically (Doorley et al., 2020). More specifically, as recent evidence suggests a functional difference between psychological flexibility and psychological inflexibility (Fang & Ding, 2022), it is important to measure each of them directly and separately.

Finally, Ong, Pierce, et al. (2019) and Fledderus et al. (2012) have used the IRT framework to examine item functioning within the AAQ-II. For the current COSMIN checklist evaluation, I reviewed Ong, Pierce, et al. (2019). According to my review, Ong, Pierce, et al. (2019) partially met the methodological rigor of IRT analysis based on the COSMIN criteria; (a) the authors specifically mentioned that they employed Graded Response Model (GRM; Samejima, 1997), (b) the information was insufficient to determine which specific software programs were used for the analyses, (c) the estimation methods were not clearly articulated in the article, and (d) the procedure of verifying model assumptions (e.g., unidimensionality and local independence) was not provided. Based on the results of IRT analyses, Ong, Pierce, et al. (2019) suggested that the AAQ-II did not appear to perform well in which there was a possibility that the respondents might not interpret items in AAQ-II consistently with respect to how they were designed.

Taken together, while the AAQ-II is one of the most widely used scales to measure psychological inflexibility or experiential avoidance, its psychometric properties (e.g., discriminant validity) have been questioned across several independent studies (e.g., Rochefort et al., 2018; Tyndall et al., 2019; Wolgast, 2014). Also, the unidimensional feature of AAQ-II may not fully represent the complex and dynamic nature of psychological inflexibility and does not adequately measure the construct of psychological flexibility.

1.2.2. Avoidance and Fusion Questionnaire for Youth

The Avoidance and Fusion Questionnaire for Youth (AFQ-Y; Greco et al., 2008) is a 17-item self-report questionnaire designed to assess psychological inflexibility for youths aged between 10 and 16 years old. In terms of the factor structure, the authors noted that the AFQ-Y arguably measures a single factor of psychological inflexibility, but reflects two interrelated subprocesses: *cognitive fusion* and *experiential avoidance*. Example items include “My thoughts and feelings mess up my life” and “I stop doing things that are

important to me whenever I feel bad.” All items are rated using a 5-point Likert scale, which ranges from 0 (i.e., not at all true) to 4 (i.e., very true), with greater scores reflecting higher levels of psychological inflexibility.

Cherry et al. (2021) reported that the AFQ-Y received full ratings for content validity, internal consistency, and discriminant validity, whereas the criterion of test-retest reliability and definition/measure alignment were evaluated as insufficient. Also, its interpretability was evaluated as partially satisfactory because of the limited information on clinically relevant changes that the scale can provide. Similar to the AAQ-II, many researchers who used the AFQ-Y infer the presence of psychological flexibility through the absence of psychological inflexibility (Cherry et al., 2021).

Greco et al. (2008) used the extension of the Rasch model to identify best-functioning items in the AFQ-Y. The quality of this study met some criteria of COSMIN because the authors (a) employed Rasch rating scale model to treat Likert scale responses as ordered polytomous responses, (b) used WINSTEPS (Wang & Chen, 2005), (d) examined unidimensionality, but the method of estimation used for the study was not mentioned in the paper. Results of IRT analyses in Greco et al. (2008) also suggested that the AFQ-Y is the most useful in identifying youths with elevated levels of psychological inflexibility.

In sum, the AFQ-Y appears to have strength in measuring psychological inflexibility, especially among the youth population (Cherry et al., 2021). However, the AFQ-Y is also subject to the weaknesses discussed for the AAQ-II in the domain of the lack of measuring psychological inflexibility and psychological flexibility, separately and multidimensionally as related and yet distinct processes.

1.2.3. Comprehensive Assessment of Acceptance and Commitment Therapy Processes

The Comprehensive Assessment of Acceptance and Commitment Therapy Processes (CompACT; Francis et al., 2016) is a 23-item self-report questionnaire designed to measure

three response styles within psychological flexibility. More specifically, following the tripartite framework of psychological flexibility (Hayes et al., 2011), the CompACT consists of three subscales; (a) *openness to experience* (e.g., “I am willing to fully experience whatever thoughts, feelings and sensations come up for me, without trying to change or defend against them”), (b) *behavioral awareness* (e.g., “I rush through meaningful activities without being really attentive to them” reverse scored), and (c) *valued action* (e.g., “I can identify the things that really matter to me in life and pursue them”) in addition to an overarching second-order factor of psychological flexibility. All items are responded to using a 7-point Likert scale, ranging from 0 (i.e., strongly disagree) to 6 (i.e., strongly agree) with greater scores reflecting higher levels of psychological flexibility.

Cherry et al. (2021) reported that the CompACT has good content validity, internal consistency, and discriminant validity. The scale was also rated as being satisfactory in the domain of definition/measure alignment (i.e., construct definition aligning with the item content of the measure) (Cherry et al., 2021). However, the CompACT was evaluated as insufficient for test-retest reliability and interpretability mainly because of the lack of examination of these criteria in the original psychometric paper.

Ong et al. (2020) examined item performance within the CompACT using the IRT framework with data from the community ($n = 253$), college students ($n = 261$), and treatment-seeking clients ($n = 140$). Through my own review, the study appears to have met the methodological rigor suggested by the COSMIN. More specifically, the authors (a) used Graded response models (GRM; Samejima, 1997) to examine the performance of items, (b) reported specific software program (i.e., R studio packages) for the analysis, (c) performed the analysis using robust weighted least squares and theta parametrization, and (d) examined unidimensionality assumption. The results of IRT analyses revealed that the poor item fit of the CompACT (i.e., openness to experience subscale) may be related to the heterogenous

characteristics of the scale. Furthermore, most of the items in the CompACT showed low levels of item discrimination parameters. Ong et al. (2020) also reported a greater amount of inequivalence across clinical and nonclinical samples, indicating that item usage may need to differ based on respondent types. However, corresponding with the evaluation in Cherry et al. (2021) on discriminant validity, the CompACT was reported to represent a distinct latent construct from the psychological distress measured by the DASS-21.

In sum, based on Cherry et al. (2021), the CompACT showed relatively better psychometric qualities compared to the AAQ-II. The quality of item-level investigations through IRT analysis also showed methodological rigor. Furthermore, its multidimensional features (i.e., openness to experience, behavioral awareness, valued action) appear to capture complex processes of psychological flexibility more so than that of the AAQ-II and AFQ-Y. Finally, although the CompACT measures multi-faceted processes in psychological flexibility, it does not measure psychological inflexibility, which can be problematic given the current state of evidence in psychological flexibility and inflexibility research (Doorley et al., 2020).

1.2.4. Brief Experiential Avoidance Questionnaire

The Brief Experiential Avoidance Questionnaire (BEAQ; Gámez et al., 2014a) is a 15-item self-report questionnaire designed to measure *psychological inflexibility/experiential avoidance*. It was developed from the 62-item Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez et al., 2011) which consists of 6 dimensions of experiential avoidance: (a) *behavioral avoidance*, (b) *distress aversion*, (c) *procrastination*, (d) *distraction/suppression*, (e) *repression/denial*, and (f) *distress endurance*.

According to the original validation study (Gámez et al., 2014a), the score of BEAQ is best understood as reflecting a single factor of psychological inflexibility/experiential avoidance. Example items include “I go out of my way to avoid uncomfortable situations”

and “When something upsetting comes up, I try very hard to stop thinking about it.” All items are scored using a 6-point Likert scale, ranging from 1 (i.e., strongly disagree) to 6 (i.e., strongly agree) with greater scores reflecting higher levels of psychological inflexibility.

Cherry et al. (2021) reported that the BEAQ has good internal consistency and discriminant validity, whereas its content validity was rated as partially satisfactory. The latter was the case because, according to Cherry et al., the score of BEAQ appears to reflect negative emotionality or beliefs about emotions (e.g., “The key to a good life is never feeling any pain”) more so than the psychological inflexibility per se, and also because it appears to fail to adequately capture the core components of psychological inflexibility. Additionally, the BEAQ received the lowest evaluation for definition/measure alignment because most of the items are more consistent with a facet of psychological inflexibility (i.e., experiential avoidance), not necessarily related to psychological inflexibility as a whole. Furthermore, the BEAQ was rated unsatisfactory in test-retest reliability due to the absence of an examination, and partially satisfactory in interpretability. Finally, Cherry et al. also noted that researchers using the scale often infer the presence of psychological flexibility through the absence of psychological inflexibility/experiential avoidance, which is problematic.

To date, Ong et al. (2020) employed IRT analysis for examining the BEAQ at item levels. According to my own review, the quality of their IRT analyses seems to meet all requirements for the COSMIN since the authors (a) used Graded response models (GRM; Samejima, 1997) to examine the performance of items, (b) reported specific software program (i.e., R studio packages) for the analysis, (c) performed the analysis using robust weighted least squares and theta parametrization, and (d) examined unidimensionality assumption. The results of IRT revealed that the BEAQ has low discrimination parameter values, suggesting that items have low abilities to differentiate variations in psychological inflexibility with more precision among subjects. In other words, BEAQ items had low

amounts of contributed information on the respondents' psychological inflexibility across different levels and some items may not be as sensitive in detecting variations in this construct as it is expected.

In sum, according to Cherry et al. (2021), the BEAQ received a less favorable rating for psychometric qualities (e.g., partially satisfactory content validity, definition/measure alignment criterion not fulfilled), even compared to the AAQ-II. Although its item-level investigations through IRT analysis appear to have adequate methodological rigor, the results indicated suboptimal item functioning and evidence of misfit, suggesting the possibility that the underlying construct may have more than one dimension. Finally, as a unidimensional measure of psychological inflexibility/experiential avoidance, the BEAQ is also subject to the above-mentioned limitations in construct validity, to which other unidimensional measures of psychological inflexibility (e.g., AAQ-II, AFQ-Y) are subject.

1.2.5. Open and Engaged State Questionnaire

The Open and Engaged State Questionnaire (OESQ; Benoy et al., 2019) is a 4-item self-report questionnaire designed to measure psychological flexibility unidimensionally, with a focus on two broad response styles within the tripartite framework of psychological flexibility: *open* (acceptance and defusion) and *engaged* (values and committed action) response styles (Hayes et al., 2011). Example items include "Imagine that, in general, your life looked like the last 7 days. In what way would these seven days represent a vital, lively and fulfilled lifestyle?" All items use an 11-point Likert scale, ranging from 0 (i.e., not at all) to 10 (i.e., very much) with greater scores reflecting higher levels of psychological flexibility. The original validation study used the data of three independent German samples (i.e., 120 patients with panic disorder and/or agoraphobia, 46 patients with panic disorder with agoraphobia, and 85 individuals with burnout).

Cherry et al. (2021) rated the OESQ as being satisfactory in the domains of internal consistency and discriminant validity. The OESQ was rated as being partially satisfactory in content validity as the items of the OESQ partially cover the construct of psychological inflexibility. However, the scale was rated unsatisfactory for definition/measure alignment and insufficient (i.e., sufficient information is not available) for test-retest reliability and interpretability. Similar to the AAQ-II and the BEAQ, the OESQ measures psychological flexibility by examining the absence of psychological inflexibility, which is problematic (Cherry et al., 2021). To date, the OESQ has not been examined through the IRT approach.

1.2.6. Everyday Psychological Inflexibility Checklist

The Everyday Psychological Inflexibility Checklist (EPIC; Thompson et al., 2019) is a 7-item self-report questionnaire designed to measure psychological inflexibility in the context of everyday life. The EPIC measures psychological inflexibility multidimensionally with two facets; *avoidance* (e.g., “I try to avoid thinking about difficult topics”) and *behavioral rigidity* (e.g., “I find I follow rigid patterns when doing some tasks”). All items use a 7-point Likert scale, ranging from 1 (i.e., never true) to 7 (i.e., always true) with greater scores reflecting higher levels of psychological inflexibility.

Cherry et al. (2021) reported that the EPIC received full ratings for content validity and internal consistency, whereas its discriminant validity has not been tested. EPIC was also rated as unsatisfactory or having insufficient information for test-retest reliability, interpretability, and definition/measure alignment. To date, the EPIC has not been examined using IRT analysis, and the items of the EPIC capture the construct of psychological inflexibility only partially, which is problematic.

1.2.7. Personalized Psychological Inflexibility Index

The Personalized Psychological Flexibility Index consists of 15 core items designed to measure psychological flexibility, which is succinctly defined as the pursuit of valued

goals despite the presence of distress. Kashdan and colleagues argue that psychological flexibility is context-specific and that it is particularly relevant to the situation that calls for valued actions. They also noted that other scales of psychological flexibility, such as the AAQ-II, BEAQ, and AFQ-Y, are limited in construct validity in that they do not account for this context-specific nature in assessing one's psychological flexibility.

To overcome this limitation, the PPFi first asks participants to identify an important goal (one and only one goal in any area of their life) that they are working on, and then they are asked to rate the three facets of psychological flexibility/inflexibility in the context that is specific to that goal. More specifically, the PPFi includes three subscales; *Avoidance* (e.g., "I avoid the most difficult goal-related tasks"; reverse-scored), *Acceptance* (e.g., "I accept things I cannot change about this goal"), and *Harnessing* (e.g., "I find worrying helpful to solving goal-related problems"). All items use a 7-point Likert scale, ranging from 1 (i.e., strongly disagree) to 7 (i.e., strongly agree) with greater scores reflecting higher levels of psychological flexibility. The items in the Avoidance facet are reverse-scored to be aligned with the other two facets.

Cherry et al. (2021) reported that the PPFi received full ratings for most of the criteria, including content validity, internal consistency, discriminant validity, test-retest reliability, and definition/measure alignment, whereas its interpretability was evaluated as being unsatisfactory due to the limited information on clinically relevant changes that the scale can provide. Cherry et al. also noted that the PPFi is the best measure available to assess psychological flexibility because psychological flexibility measured by the PPFi adequately captures its contextual and individualized nature, and also because it measures psychological flexibility multidimensionally. However, its multidimensional account does not align with the Hexaflex model of psychological flexibility. Specifically, the PPFi measures psychological flexibility using the limited dimensions of both psychological flexibility (e.g.,

acceptance) and psychological inflexibility (e.g., avoidance), and it fails to measure psychological inflexibility separately. To date, the PPFi has not been examined utilizing IRT analysis.

1.2.8. Psy-Flex

The Psy-Flex (Gloster et al., 2021) is a 6-item self-report questionnaire designed to measure psychological flexibility unidimensionally, in which each item reflects each of the six processes in the Hexaflex model. Example items include “Even if I am somewhere else with my thoughts, I can focus on what’s going on in important moments,” and “I engage thoroughly in things that are important, useful, or meaningful to me.” All items use a 5-point Likert scale, ranging from 1 (i.e., very seldom) to 5 (i.e., very often). Responses are summed for a total score, ranging from 6 to 30 with greater scores reflecting higher levels of psychological flexibility.

Because the Psy-Flex has been developed more recently, the scale was not evaluated by Cherry et al. (2021). As shown in Table 1.1, I followed the evaluation criteria and the scale received full ratings for content validity, internal consistency, discriminant validity, and definition/measure alignment. Additionally, the Psy-Flex received the lowest evaluation for test-retest reliability due to the insufficient available information on this criterion. And its interpretability was evaluated as being satisfactory because of the information on clinically relevant changes that the scale can provide. To date, the Psy-Flex has not been examined using an IRT approach. Additionally, the Psy-Flex only measures psychological flexibility, and inferences regarding psychological inflexibility may be less tenable.

1.2.9. Multidimensional Psychological Flexibility Inventory

Finally, the Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2018) consists of 60 items with 30 items designated to a second-order factor of psychological flexibility and the other 30 items to psychological inflexibility. Following the

Hexaflex model of psychological flexibility, the domain of *psychological flexibility* includes six facets; *acceptance* (e.g., “I opened myself to all of my feelings, the good and the bad”), *present moment awareness* (e.g., “I was attentive and aware of my emotions”), *self-as-context* (e.g., “Even when I felt hurt or upset, I tried to maintain a broader perspective”), *cognitive defusion* (e.g., “I was able to let negative feelings come and go without getting caught up in them”), *values* (e.g., “I was very in-touch with what is important to me and my life”), and *commitment* (e.g., “Even when I stumbled in my efforts, I didn't quit working toward what is important”). Similarly, the domain of *psychological inflexibility* in the MPFI also has six factors: *experiential avoidance* (e.g., “When I had a bad memory, I tried to distract myself to make it go away”), *lack of awareness* (e.g., “I did most things mindlessly without paying much attention”), *self-as-content* (e.g., “I thought some of my emotions were bad or inappropriate and I shouldn't feel them”), *cognitive fusion* (e.g., “Negative thoughts and feelings tended to stick with me for a long time”), *lack of values* (e.g., “My priorities and values often fell by the wayside in my day to day life”), and *inaction* (e.g., “Negative feelings often trapped me in inaction”). Six-point Likert scale is employed to score each item; (1) never true, (2) rarely true, (3) occasionally true, (4) often true, (5) very often true, (6) always true with a higher score indicating high psychological flexibility and inflexibility, respectively.

Cherry et al. (2021) reported that the MPFI received full ratings for most of the criteria, including content validity, internal consistency, discriminant validity, interpretability, and definition/measure alignment, whereas the scale received the lowest evaluation for test-retest reliability due to the insufficient available information on this criterion. They also noted that the MPFI appeared to be one of the best measures available to assess both psychological flexibility and psychological inflexibility separately.

Furthermore, unlike the other measures, the MPFI was designed to measure psychological flexibility and inflexibility separately which, to the best of my knowledge, is the only measure to do so in a psychometrically sound manner. In the original validation study, Rolffs et al. (2018) examined how each dimension of the MPFI is associated with conceptually distinct constructs. More specifically, they reported that most of the MPFI subscales demonstrated appropriately divergent validity via moderate correlations with related psychological processes (e.g., neuroticism, emotional intelligence) and adaptive functioning (e.g., relationship satisfaction, psychological distress). This indicates that these subscales measure aspects of psychological flexibility and psychological inflexibility in the Hexaflex model more so than the constructs of negative affect or general psychological well-being. Nevertheless, two of the MPFI subscales showed strong correlations with neuroticism (i.e., Fusion, $r = .69$; Inaction, $r = .66$) and psychological distress (i.e., Fusion, $r = .74$; Inaction, $r = .71$), which warrant careful interpretation.

In the original validation study, Rolffs et al. (2018) also conducted an IRT analysis to identify items in the MPFI that may be as sensitive to detecting variations in this construct as it is expected. The quality of the IRT approach they followed also met three of the four criteria of COSMIN as they used the graded response model (GRM; Samejima, 1997), with Multilog 7.0 (Thissen et al., 2003) to examine the unidimensionality and local independence. However, it is not clear which estimation methods the authors employed. On a related note, the authors specifically used an IRT approach in the early developmental stage to identify items that have large amounts of contributed information to differentiate variations in psychological flexibility and inflexibility among the 494-item pool, which was derived from 22 existing measures from the acceptance- and mindfulness- focused literature as well as 84 items created by the authors. Separate IRT analyses were then conducted for each dimension

(e.g., defusion subscale for psychological flexibility), and they chose five items that showed the highest level of information across each factor.

1.3. Critiques of Existing Measures of Psychological Flexibility and Inflexibility

According to Cherry et al. (2021), the PPFi has the highest psychometric rating, followed by the MPFI, Psy-Flex, and CompACT. These scales received overall higher ratings compared to the other measures of interest mainly because of their content validity, discriminant validity, and definition/measure alignment. Among these four scales, the MPFI and CompACT have been investigated at the item level using the IRT approach.

As discussed above, more recently developed measures of psychological flexibility, psychological inflexibility, or both were designed to address issues of poor discriminant validity (indistinct conceptual boundaries with related constructs), partial representation of psychological flexibility/inflexibility models, and arbitrary inference of one construct based on the absence of the other (Arch et al., 2022). However, most of the measures included in the present review still fall short in addressing these psychometric concerns. More specifically, the scores of PPFi and CompACT reflect the multidimensional aspects of psychological flexibility (Francis et al., 2016; Kashdan et al., 2020), and Psy-Flex was designed to capture the six processes in psychological flexibility using six items (Gloster et al., 2021). Nevertheless, these measures fail to capture the whole landscape of psychological flexibility and psychological inflexibility constructs separately as related, but distinct processes (Kashdan et al., 2020; Rogge et al., 2019), operating under the assumption that these two constructs are on a single continuum.

1.3.1. Strengths of the Multidimensional Psychological Flexibility Inventory

To my knowledge, the MPFI is the only scale that is in the trajectory of addressing the above-mentioned issues both conceptually and psychometrically. Most of all, the MPFI intends to measure all 12 processes represented in the Hexaflex models of psychological

flexibility and inflexibility (Rolffs et al., 2018). Rolffs et al. (2018) argued that the MPFI is more clinically useful than other scales by measuring these 12 core processes as CBS-informed interventions, such as ACT and process-based CBT, often target specific processes, rather than a whole psychological flexibility/inflexibility in a given intervention session. Relatedly, the MPFI measures psychological flexibility and inflexibility *separately* and *multidimensionally* as related, but distinct processes (Rolffs et al., 2018), which is consistent with the current literature of psychological flexibility/inflexibility (Doorley et al., 2020; Macri & Rogge, 2024) as well as the original Hexaflex model of psychological flexibility/inflexibility (Hayes, Strosahl, et al., 2012).

1.3.2. MPFI: Areas of Improvement

In my own review, the MPFI appears to be the most psychometrically sound measure in terms of the alignment to the Hexaflex model of psychological flexibility and psychological inflexibility. That being said, the MPFI can benefit from additional psychometric investigations to understand its psychometric quality and to advance its clinical validity in practice. The section below outlines areas of improvement for the MPFI.

1.3.2.1. Measurement Invariance

First, measurement invariance, a statistical property of measurement indicating that the same construct is being measured across different groups, was not employed in the development process (Rolffs et al., 2018). Although the original study reported a reliability coefficient measured by Cronbach's alpha across different sets of groups (i.e., gender, age, race, education, clinical status, and meditation experience), this evidence cannot be used to support the claim that the measurement equivalence was held across group memberships (Van de Schoot et al., 2012). Testing measurement invariance at the structural level is an important step to ensure the validity of a scale so that the scale can be applied to different populations (Horn & McArdle, 1992). If measurement invariance is not held across the

groups of interest, it suggests that the scale has a different structure or meaning to different groups or occasions (i.e., time), and as such, the scale cannot be meaningfully tested or construed across these groups (Van de Schoot et al., 2012). In other words, if there are differences between groups, such differences should arise from the latent traits of interest rather than a measurement tool (Putnick & Bornstein, 2016).

A previous study with a Hawai‘i-based sample of college students reported measurement invariance of CBS-informed measures, including AAQ-II, Five Facets of Mindfulness Questionnaire (FFMQ; Baer et al., 2006), and Engaged Living Scale (ELS; Tronpetter et al., 2013), across gender and race (Spencer et al., 2022). Gender and race are commonly employed categories in multigroup confirmatory factor analysis (Hong et al., 2003). The present dissertation also used gender and race categories to the extent the present Hawai‘i-based study sample allowed to explore the measurement invariance of MPFI. When examining measurement invariance with multigroup confirmatory factor analysis, stepwise statistical analysis can be used (Putnick & Bornstein, 2016; Van de Schoot et al., 2012); configural invariance, metric invariance, scalar invariance, and residual invariance.

Configural invariance refers to the extent to which a test performed on each group has the same structure (i.e., the number of factors and pattern of factor loadings). When examining configural invariance, the models are established for each group first, and then, the model fits are examined. If the models have appropriate model fits for each group, the models can be applied to each group at the same time (Putnick & Bornstein, 2016). The model with configural invariance was used as a baseline model for subsequent examinations for different invariances.

Metric invariance refers to the extent to which a factor loading that an observed variable has for a latent factor are equal across groups (Putnick & Bornstein, 2016). The factor loading indicates the relationship (i.e., magnitude and direction) between the latent

factor and the observed variable (Van de Schoot et al., 2012). Metric invariance is particularly important because it allows multi-group comparisons of factor variances and covariances (Putnick & Bornstein, 2016).

Scalar invariance adds constraints on top of the metric invariance model to make item intercepts to be equivalent across groups (Putnick & Bornstein, 2016). Scalar invariance indicates that respondents across groups have the same intercepts on the observed variables given that the latent factor equals 0. In other words, rejection of scalar invariance may inform that the item intercepts are not similar for respondents of different groups and any statistically significant differences in group means may be due to differences in scale properties at different groups, preventing multi-group comparisons of factor means (e.g., t-tests or ANOVA).

Finally, *residual invariance* adds more restriction to the model while containing the constraints in the scalar model (Putnick & Bornstein, 2016). It fixes factor loadings, intercepts, and item error variance to be equal across groups. The residual invariance is related to the equivalence of the measurement tool. However, experts argue that it may not be realistic to require residual invariance in the context of social science (Byrne & Stewart, 2006). The residual variance is the portion of item variance not attributable to the factor (e.g., the residual variance of an item that is not explained by the acceptance factor in psychological flexibility) and Vandenberg and Lance (2000) recommended that the evaluation of the residual invariance be left to the researcher's discretion. As such, the current study relied on the results from metric or scalar invariance to determine the measurement equivalence.

1.3.2.2. Number of Category Responses

Second, it is worth empirically examining whether the 6-point Likert scale that MPFI currently employs is in fact psychometrically adequate. In the original validation study

(Rolffs et al., 2018), the authors mentioned that they used Graded Response Model (GRM; Samejima, 1997) for the application of IRT, however, the specific analyses to determine the categories were not presented. The examination of suggested categories of a scale remains important since it is still unclear whether respondents in fact perceive or understand the scale as expected.

Extent literature suggests that the 6-point response option, which the MPFI employs, is in a favorable or superior position in measuring the construct of interest compared to fewer-point response categories, for example, the 5-point or 4-point response category (Rolffs et al., 2018). That is, the psychometric literature suggests that having fewer scale points works worse in certain contexts because it artificially attenuates variance (Nunnally, 1994). For example, participants will be compelled to make the next best alternatives to questions if there are a limited number of response categories. In the case of a 5-point scale, a respondent might be forced to choose between 4 or 5 although the respondent thinks the middle point of them (i.e., 4.5) describes themselves most appropriately.

On the other hand, having 6 response options might not be suitable for MPFI. That is because even though some of the subscales of MFPI (e.g., present moment awareness, committed action) can be adaptive response strategy to internal events, such as negative emotions, some of the processes in psychological flexibility are perhaps one the most infrequent approaches people take (Kashdan et al., 2020), and sometimes misguided if proper understanding of the construct does not follow (Baer et al., 2008). Under these circumstances, respondents might not be able to meaningfully identify differences between “often true (i.e., 4),” “very often true (i.e., 5),” and “always true (i.e., 6)” on a 6-point scale of MPFI compared to “often true (i.e., 4)” and “always true (i.e., 5)” as such in a fewer-point scale (i.e., 5-point scale). Also, given the unfamiliar nature of the construct, participants might put

more effort into selecting the applicable responses among the 6 options, experiencing unnecessary fatigue and making inaccurate choices (Leung, 2011).

Perhaps, the biggest difference between the 5 and 6 response categories might be the use of a midpoint (e.g., neutral, neither agree nor disagree) on the Likert scale. Extant literature suggests that respondents often interpret a midpoint of a scale according to their understanding which might not be aligned with the researcher's intention (Baka et al., 2012). Some of these cases include lack of knowledge, ambivalence, and disputing aspects of the question, which all indicate that the choices are not due to respondents having neither a positive response nor a negative response (Baka et al., 2012).

A study examined the perceptions of respondents toward a midpoint (i.e., neither agree nor disagree) in 5-point scales with the qualitative method (Nadler et al., 2015). The study pointed out that central tendency bias and social desirability bias would arise with a scale containing a midpoint, whereas an even-numbered scale (e.g., 4-point or 6-point) did not present such issues since respondents are not allowed to choose neutrality (Nadler et al., 2015).

Some suggestions have been made in the context of scale development and refinement in order to prevent respondents from misusing the midpoint. Chyung et al. (2017) reported that a midpoint can be employed when respondents are familiar with the topic and should be allowed to express a neutral opinion. On the other hand, if respondents are not expected to have formed their opinion about the topic, it is recommended to omit the midpoint to eliminate the possibility of misusing it (Chyung et al., 2017). Taking these recommendations into account, my dissertation project also examined the empirical evidence to choose the most appropriate response categories in MPFI. Thus, the current 6-point rating categories were further examined with the application of IRT.

1.3.2.3. Selection of Items

Third, in the original validation study (Rolffs et al., 2018), the authors presented a short form of 24-item MPFI which includes only two items for each subscale (e.g., defusion) resulting in 12 items for psychological flexibility and 12 items for inflexibility. The original study was then followed by a validation study for the short MPFI (Seidler et al., 2020). In light of the limitations associated with scales featuring numerous items, such as the 60-item MPFI, it is common practice to develop a shortened version of the original scale (e.g., Gámez et al., 2014a). For example, the attention of a respondent may be affected by increased test time and fatigue for a test containing many items. When multiple test tools are used at once in a clinical setting, clients may complain of emotional and cognitive difficulties. Furthermore, it is possible for the participants to respond recklessly, which may reduce the accuracy of the test results (Rammstedt & Beierlein, 2014).

Because of these reasons, the development of a short form for a scale is particularly common in health science as it is necessary to quickly and accurately identify the condition of individuals to create an intervention strategy (Putnam & Rothbart, 2006). The shortened test has the advantage of providing information close to the original test in a relatively stable manner, although it has a loss of information compared to the original version (Rammstedt & Beierlein, 2014). Particularly relevant to the current topic, Thomas et al. (2021) recently examined the factor structure of MPFI with bifactor analysis in a large community sample in the U.S., and they found that most of the subfactors in psychological flexibility and inflexibility evidenced redundancy with their respective general factors. This suggests room for further refinement (e.g., shortening the scale by selecting well-functioning items), which might be necessary to ensure the incremental utility of each factor. The original article did not report in detail how they selected items for short MPFI, except that these items were identified as the most informative ones through IRT analysis (Rolffs et al., 2018).

The most important consideration in terms of the development of a short-form scale may lie in the efficiency; the balance between the possible resources needed (e.g., time, energy, and financial resources), and accurate estimation of respondents' traits (Smith et al., 2000). Therefore, several considerations should be made in order to make a short version of a scale (Widaman et al., 2011). For example, in addition to the amount of information that an item has, it is crucially required in the item selection process to examine whether groups (e.g., gender, ethnicity) have different probabilities of endorsing a given item. This is especially relevant to the field of clinical psychology (Lewis & Araya, 1995) as biased items on a scale or interview question may lead to inaccurate diagnoses of mental disorders and treatment conceptualization (Nahlik, 2004). Therefore, the employment of measurement tools that have sufficient psychometric properties is also related to ethical considerations. Considering the advantages of a short-form scale, it may be important to maximize its strength (i.e., efficiency) while ensuring the quality of the scale.

Previous research commonly employed factor analyses to refine questionnaires with many items. For example, the 39-item Five Facet Mindfulness Questionnaire (FFMQ) has been widely used to measure respondents' mindfulness (Baer et al., 2006). And several attempts have been made to shorten the scale, mostly based on the result of factor analyses (Bohlmeijer et al., 2011; Tran et al., 2013). However, examining the structural properties of a scale may not necessarily provide accurate information on how each item functions and the development of a short-form scale solely based on factor analyses may engender an inequivalent abbreviated version in its function compared with the original scale. Thus, researchers are required to consider several aspects in the refinement process of a long questionnaire.

1.3.2.4. Practical Aspects

Fourth, having only two items for each factor (e.g., defusion) makes the short MPFI limited in its usage. That is, research on the process of change has been increasingly popular in the field of clinical psychology (Hofmann & Hayes, 2019), and path analysis with moderation and mediation models using structural equation modeling (SEM) has been widely employed for the purpose (e.g., Blanca et al., 2018; Jo, Woo, et al., 2023). Path analysis is a special form of SEM, in which causal relationships between variables can be inferred (Kline, 2015). In the SEM literature, it is generally suggested that a latent construct has at least *three* indicators (e.g., items) whose errors are uncorrelated with each other (Kline, 2015). As such, the examination of models containing latent variables with less than three indicators is often discouraged (Kline, 2015).

At the same time, it has also been suggested to construct the latent variable with the best possible indicators (e.g., three observable variables) since too many indicators may introduce more complications and problems than parsimony in a model (Hayduk & Littvay, 2012). Given the practical application of the short MPFI in the path analysis using SEM, the current study aimed to construct each factor with three items.

1.3.2.5. Validation with Racially Diverse Population

Lastly, the psychometric investigation of the MPFI has not been conducted for racially diverse groups (e.g., Hawai'i) of adults in the U.S. The U.S. is becoming more racially diverse in which a growing number of people identify themselves with more than one race (U.S. Census Bureau, 2021). While the White American population remains the largest race or ethnic group in the U.S., the proportion of this group decreased by 8.6% in the last decade, while the multiracial population has increased by 276% since 2010 (U.S. Census Bureau, 2021). Hawai'i has been reported to be the most racially diverse state in the U.S. (U.S. Census Bureau, 2021), which is an ideal place to investigate the psychometric properties of MPFI for racially diverse groups.

With the multiracial population growing in the U.S. at large, it has become increasingly important to design and validate scales that accurately measure psychological constructs such as psychological flexibility and inflexibility in a multiracial context (Dong & Dumas, 2020). This is especially relevant to the concept of measurement equivalence in which factor structures can be compared between the original study (e.g., predominantly White samples; Rolffs et al., 2018) and the current study (e.g., racially diverse samples in Hawai‘i). The present dissertation project explored whether the original factor structures (i.e., five items for each 12 factor with two higher-order factors) can be replicated with samples in Hawai‘i.

1.4. Specific Aims of Dissertation

Previous research on the measures of psychological flexibility and inflexibility has suggested weaknesses and strengths of existing scales (Cherry et al., 2021; Doorley et al., 2020). Among them, the MPFI appears to possess optimal advantages including, but not limited to, alignment with ACT theory, discriminant validity, and the employment of modern test theory in its developmental stage (Rolffs et al., 2018). Nevertheless, as explained in detail above, the MPFI can be examined and refined further. More specifically, my dissertation project consisted of two overarching studies (i.e., Study 1 and Study 2) with relevant goals which are described as follows.

1.4.1. Aim 1.

The first study (i.e., Study 1) focused on identifying the best functioning items among the original 60 items with a Hawai‘i-based sample of racially diverse participants recruited from undergraduate students in a public university in Hawai‘i ($N = 719$).

Aim 1.1. The factor structure of the original 60-item MPFI was explored to find whether the theory-driven factor structure of psychological flexibility and inflexibility would be replicated with a racially diverse sample. This aim

provided evidence concerning internal factor structure by assessing how well the individual items within the instrument align with the purported underlying constructs in content.

Aim 1.2. IRT model (i.e., GPCM) was applied to estimate item parameters in each factor to identify well-functioning items (e.g., large information, high discrimination parameter, appropriate item fit).

Aim 1.3. Item response category of MPFI was examined to evaluate the original 6-point Likert scale.

Aim 1.4. Measurement equivalence of the original MPFI on the groups (e.g., gender and ethnicity) was examined.

Aim 1.5. Validity evidence of the original MPFI based on the relationship with other measures was examined. This aim provided preliminary evidence of its validity via examining its relationship with other theoretically relevant variables.

Aim 1.6. Based on the findings, the content validity was discussed in consultation with an expert in the field and the final selection of items was made to compose the shortened MPFI in consideration for the practical usage of the scale (e.g., 3 items for each factor).

1.4.2. Aim 2.

The second study (i.e., Study 2) evaluated the psychometric properties of the shortened MPFI (MPFI-S) with another Hawai‘i-based sample of undergraduate students ($N = 698$) to verify whether it functions optimally in various contexts such as comparison with the original 60-item MPFI.

Aim 2.1. The factor structure of the shortened MPFI (MPFI-S) derived from Study 1 was examined and confirmed.

Aim 2.2. The suggested item response category identified in Study 1 as well as item functioning were examined and confirmed with MPFI-S.

Aim 2.3. The psychometric properties of the MPFI-S was compared with the original MPFI's characteristics to find whether the short form also measures the same construct despite of loss of information due to fewer items.

Aim 2.4. The convergent and divergent validities of MPFI-S were explored by examining relationships with other related measures.

2. Study 1

2.1. Method

2.1.1. Sample Size Estimation and Participants

Extant literature suggests an adequate sample size to obtain stable factor analysis results is 3 to 20 times the number of variables, or between 100 and 1,000 participants (MacCallum et al., 1999; Mundfrom et al., 2005). When it comes to determining the optimal sample size for factor analyses, there can be a range of opinions among researchers. That being said, in general, less than 100 participants are considered poor, and more than 300 participants are considered acceptable for factor analysis (Kline, 2015).

Generally speaking, IRT analyses require a larger sample size compared with that of factor analysis. Although the guidelines for an adequate sample size for IRT analysis (e.g., obtaining accurate item parameter estimates) have not been firmly established (Morizot et al., 2007), some researchers have argued that a minimum sample size of 500 respondents is necessary to achieve stable estimates (Reeve & Payers, 2005). Relatedly, when estimating GPCM parameters, it has been suggested to have a sample size 20 times larger than the item parameters (Embretson & Reise, 2013). As the current study estimated one discrimination parameter and five category parameters for each item in 12 subscales of MPFI, the sample

size of 600 (i.e., 5 items in a subscale \times 6 parameter estimates \times 20 times) would be adequate for estimating these parameters.

In Study 1, a total of 803 individuals completed an online survey designed to explore psychological flexibility and its association with various mental and behavioral health indicators. The survey included four accuracy-check questions to ensure the accuracy of participant responses. To be considered a valid participant, individuals had to answer all four accuracy-check questions correctly by selecting a specified response (e.g., “choose 3 as the answer for this question”). Consequently, 719 participants met the criteria and were included in the final sample.

As presented in Table 2.1, the average age of the final sample was 20.48 years old ($SD = 3.93$), and the majority identified themselves as women ($n = 521, 71.46\%$). Participants in the final sample were racially diverse, with 35.05% identifying as Asian, 30.46% as Non-Hispanic White, 19.19% as Multiracial, 7.51% as Latinx, 2.78% as Hawaiian, 2.5% as Pacific Islander, 1.39% as Non-Hispanic Black, 0.7% as Native American, and finally 0.42% as Others. The racial and ethnic composition of the study sample closely mirrored that of the state of Hawai‘i (U.S. Census Bureau, 2021). Additionally, participants self-identified their family’s financial status, revealing that 46.1% were from the middle class, 22.42% from the upper middle class, 22.01% from the working class, 5.43% from the poor class, and 4.04% from the wealthy class.

A cross-validation approach was employed by randomly dividing data into two segments, hereafter referred to as Sample 1 ($n = 360$) and Sample 2 ($n = 359$). Statistically significant differences were not found between Sample 1 and Sample 2 in age ($t = 1.41, p = .16$), gender ($\chi^2 = .49, p = .97$), race ($\chi^2 = 51.34, p = .87$), sexual orientation ($\chi^2 = 11.46, p = .25$), financial status ($\chi^2 = 14.51, p = .56$), nor in scores of all MPFI items ($ts < 2.03, ps > .05$).

2.1.2. Procedure

Participants for Study 1 were recruited from a range of undergraduate psychology classes (e.g., Introduction to Psychology, Research Methods, Developmental Psychology, Abnormal Psychology, etc.) at the University of Hawai‘i at Manoa through SONA between September 2022 and April 2023. The study received approval from the Institutional Review Board at the University of Hawai‘i at Manoa. Participants were introduced to procedures of the study when they reviewed the informed consent form, and if they consented to participate, they anonymously completed questionnaires on a secure online platform (i.e., SONA) in exchange for course credit.

2.1.3. Measure

2.1.3.1. Demographic Form

The demographic questionnaire was included to collect information regarding the gender, age, race/ethnicity, financial status, and sexual identity of respondents (see Appendix A). More specifically, gender categories included male, female, and other. Race/ethnicity was identified with the following categories: Native American, Latinx, Asian, Pacific Islander, White, Black, Hawaiian, Other, or Biracial/Multicultural (i.e., multiracial). Age was coded as a continuous variable. Also, financial status was categorized as poor class, working class, middle class, upper middle class, and wealthy class. Lastly, participants were asked to identify their sexual identity by selecting among being heterosexual, homosexual, bisexual, or other.

2.1.3.2. The Multidimensional Psychological Flexibility Inventory

The Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2018) consists of 60 items with 30 items designated to a second-order factor of psychological flexibility and the remaining 30 items to psychological inflexibility (see Appendix B). Psychological flexibility includes six factors such as *Acceptance* (e.g., “I opened myself to all

of my feelings, the good and the bad.”), *Present moment awareness* (e.g., “I was attentive and aware of my emotions.”), *Self-as-context* (e.g., “Even when I felt hurt or upset, I tried to maintain a broader perspective.”), *Cognitive defusion* (e.g., “I was able to let negative feelings come and go without getting caught up in them.”), *Value* (e.g., “I was very in-touch with what is important to me and my life.”), and *Commitment* (e.g., “Even when I stumbled in my efforts, I didn’t quit working toward what is important.”).

Psychological inflexibility also has six factors: *Experiential avoidance* (e.g., “When I had a bad memory, I tried to distract myself to make it go away.”), *Lack of awareness* (e.g., “I did most things mindlessly without paying much attention.”), *Self-as-content* (e.g., “I thought some of my emotions were bad or inappropriate and I shouldn’t feel them.”), *Cognitive Fusion* (e.g., “Negative thoughts and feelings tended to stick with me for a long time.”), *Lack of value* (e.g., “My priorities and values often fell by the wayside in my day to day life.”), and *Inaction* (e.g., “Negative feelings often trapped me in inaction.”).

In the MPFI, a 6-point Likert scale is employed to score each item; (1) never true, (2) rarely true, (3) occasionally true, (4) often true, (5) very often true, (6) always true with a higher score indicating high psychological flexibility and inflexibility, respectively. Previous research indicated the evidence of construct validity with 12 factors and two higher-level superordinate factors (Tabrizi et al., 2023). Additionally, the measure has demonstrated acceptable internal consistency, with Cronbach’s alphas ranging from 0.78 to 0.94 for each of these factors (Landi, Pakenham, Giovannetti, et al., 2021). Furthermore, the measure exhibits evidence of discriminant validity in comparison to anxiety and depression, as well as convergent validity when correlated with related measures like AAQ-II and CompACT (Landi, Pakenham, Crocetti, et al., 2021; Landi, Pakenham, Giovannetti, et al., 2021).

2.1.3.3. The Psy-Flex

The Psy-Flex (Gloster et al., 2021) is a 6-item self-report questionnaire designed to measure psychological flexibility in which each item reflects six key processes in the Hexaflex model (see Appendix C). The measure consists of a single factor. Example items include “Even if I am somewhere else with my thoughts, I can focus on what’s going on in important moments,” and “I engage thoroughly in things that are important, useful, or meaningful to me.” All items use a 5-point Likert scale, ranging from 1 (i.e., very seldom) to 5 (i.e., very often) with greater scores reflecting higher levels of psychological flexibility. The original study reported criterion validity as well as acceptable internal consistency (Gloster et al., 2021). The original development study revealed evidence of construct validity, showing a unidimensional factor structure comprising six items. Furthermore, the measure has exhibited reliable internal consistency, with Cronbach’s alphas varying from 0.78 to 0.97, depending on the study samples (Gloster et al., 2021). Additionally, the measure has demonstrated evidence of convergent validity when compared to related constructs such as well-being (Gloster et al., 2021). The Cronbach’s α in the current sample was .91.

2.1.3.4. The Personalized Psychological Flexibility Index

The Personalized Psychological Flexibility Index (PPFI; Kashdan et al., 2020) comprises 15 central items, designed to evaluate psychological flexibility which referred to the ability to pursue valued life goals despite the presence of distress (see Appendix D). The PPFI is tailored to the individual by prompting participants to respond to the items based on “an important goal that you are working on.” Additionally, the PPFI includes four optional items that are designed to capture potential moderators that are tied to the self-chosen goals. The 15 items are conceptually classified into three dimensions: *Avoidance*, *Acceptance*, and *Harnessing*. *Avoidance* pertains to the tendency to avoid or procrastinate on challenging goal-related tasks (e.g., “I avoid the most difficult goal-related tasks.”). *Acceptance* involves being willing to experience discomfort or difficult emotions in pursuit of that goal (e.g., “I accept

things I cannot change about this goal.”). *Harnessing* refers to the ability to utilize negative emotions and thoughts constructively to solve problems related to the goal (e.g., “I find worrying helpful to solving goal-related problems.”). Each item is scored on a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree), with five items in the *Avoidance* being reverse-scored. Previous research indicated the evidence of construct validity with three factor structure (Jo, Im, et al., 2023). Additionally, the measure has demonstrated acceptable internal consistency, with Cronbach’s alphas ranging from 0.70 to 0.88 for each of these factors (Jo, Im, et al., 2023). Furthermore, the measure exhibited evidence of discriminant validity in comparison to negative emotionality, as well as convergent validity when correlated with related constructs such as well-being (Akbari et al., 2021). The Cronbach’s α s in the current sample were .89 for Acceptance, .81 for Avoidance, and .76 for Harnessing.

2.1.3.5. The Distress Tolerance Scale

The Distress Tolerance Scale (DTS; Simons & Gaher, 2005) consists of 15 items measuring the belief and extent to which respondents can handle aversive emotions or feelings of distress (see Appendix E). The DTS has four subscales including *Tolerance*, *Absorption*, *Appraisal*, and *Regulation*. *Tolerance* refers to the perceived ability to tolerate distress (e.g., “I can’t handle feeling distressed or upset.”) and *Absorption* intends to measure how much attention is absorbed by the distress (e.g., “When I feel distressed or upset, I cannot help but concentrate on how bad the distress actually feels.”). *Appraisal* measures how an individual willingly experiences psychological distress without resisting it (e.g., “My feelings of distress or being upset scare me.”). *Regulation* refers to the effort expended to alleviate distress (e.g., “When I feel distressed or upset, I must do something about it immediately.”). Subscale scores are derived by averaging across relevant items. And the total score is calculated by averaging subscale scores. A 5-point Likert scale is employed to score

each item with (1) never true, (2) seldom true, (3) sometimes true, (4) frequently true, and (5) always true. Previous research showed evidence of construct validity involving three factors and a higher-level superordinate factor (Brown et al., 2022). Furthermore, the measure displayed reliable internal consistency, with Cronbach's alphas ranging from 0.76 to 0.86 for each of these factors (Brown et al., 2022). Additionally, the measure has exhibited validity evidence through its relationship with other pertinent constructs, such as emotion regulation (Brown et al., 2022). The Cronbach's alphas in the current sample were .82 for Tolerance, .83 for Absorption, .78 for Appraisal, and .88 for Regulation.

2.1.3.6. The Depression Anxiety and Stress Scale

The Depression Anxiety and Stress Scale (DASS-21; Henry & Crawford, 2005) is a self-report questionnaire consisting of 21 items (see Appendix F). The scale intends to measure levels of psychological distress across several dimensions such as depression, anxiety, and stress. *Depression* refers to a group of conditions associated with low mood and loss of interest (e.g., "I couldn't seem to experience any positive feeling at all."). *Anxiety* measures how much a person experiences intense, excessive, and persistent worry and fear about certain situations. It also measures some physical symptoms such as rapid breathing and an increase in heart rate (e.g., "I experienced breathing difficulty, e.g., excessively rapid breathing, breathlessness in the absence of physical exertion."). *Stress* refers to a feeling of emotional or physical tension (e.g., "I felt that I was using a lot of nervous energy."). All items are rated using a 4-point Likert scale, ranging from 0 (i.e., did not apply to me at all) to 3 (i.e., applied to me very much, or most of the time) with greater scores reflecting higher levels of psychological distress. Previous research showed evidence of construct validity involving three factors and a higher-level superordinate factor (Tonsing, 2014). Furthermore, the measure has displayed reliable internal consistency, with Cronbach's alphas ranging from 0.73 to 0.81 for each of these factors (Tonsing, 2014). Additionally, the measure has

exhibited validity evidence through its relationship with other pertinent constructs, such as life satisfaction (Tonsing, 2014). The Cronbach's α s in the current sample were .89 for Depression, .87 for Anxiety, and .87 for Stress.

2.1.4. Data Analysis

R, version 4.1.2 (R Core Team, 2024), was used for all analyses. R is an open-source program for statistics, data mining, and graphing which is mainly used for research and industry-specific applications. The list and function of R packages which were used in the current study are described in Table 1.2. Additionally, a summary of the analytical procedures are presented in Table 1.3.

2.1.4.1. Factor Analysis

There are two types of factor analyses; exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Floyd & Widaman, 1995). An EFA is commonly used to examine the possible relations between observed variables and underlying factors in which a prior model is basically absent (Kline, 2015). On the other hand, a CFA is conducted when there is a firm hypothesis on the relationship between items and latent factors and the analysis is intended to verify the predetermined model (Kline, 2015).

2.1.4.1.1. Exploratory Factor Analysis

EFA is a statistical technique to explore the underlying structure by reducing the data to small groups of items based on the direction and magnitude of correlation coefficients (Fabrigar et al., 1999). This method tests whether the relationships between multiple variables can be represented in a small number of dimensions (Fabrigar et al., 1999). These dimensions are often called constructs or factors, which refer to a concept created operationally for scientific research, such as consciousness, self, and motivation (Kline, 2015). The EFA does not serve to test specific hypotheses. Rather, its primary aim is to

examine the plausibility of structures that would describe the relationships among variables through a limited number of factors (Kline, 2015).

2.1.4.1.1.1. Missing Data

Prior to conducting EFA with Sample 1 ($n = 360$), I examined whether the data was reliable (Olson, 2003). Missing data can be handled with listwise deletion, pairwise deletion, or imputation (e.g., mean substitution), depending on the nature of the missing data (Bennett, 2001). Listwise deletion, also known as complete-case analysis, excludes all data of a participant if the participant has more than one missing value (Bennett, 2001). This method is often employed when a small number of observations/participants have missing data.

Pairwise deletion removes cases only when one of the variables pertinent to a research model is missing, maximizing all data available to increase the power in the analysis (Bennett, 2001). And imputation is the method that refers to replacing missing data with substituted values, such as mean (Bennett, 2001). In the current dissertation project, the *Naniar* package was used to examine the nature of missing data (Tierney et al., 2020), and the missing data was handled using pairwise deletion.

2.1.4.1.1.2. Outlier

Outliers in the data could affect the accurate estimation of parameters in factor analysis (Aguinis et al., 2013). A multivariate outlier, a combination of unusual scores on at least two variables, is typically examined when running factor analysis (Hancock et al., 2010). Outliers can be identified with the application of Mahalanobis distance (Penny, 1996). The *Mahalanobis* function that is built into R software was used in the current analysis.

2.1.4.1.1.3. Assumption

There are basic assumptions for factor analysis. In factor analysis, a causal relationship is established in which all latent factors become the cause of the indicators (Weston & Gore Jr, 2006). Additionally, a linear relationship is assumed between the latent

factors and the indicators, and the measurement unit of manifest variables must be either interval or ratio (Weston & Gore Jr, 2006). The linearity assumption was examined by inspecting the residual plot. The absence of a pattern indicated a non-violation of the linearity assumption.

Confirming the assumption of normality is a process that needs to be preceded to use the maximum likelihood method, which is sensitive to the multivariate normal distribution (Kahn, 2006). The Kolmogorov-Smirnov test and the Shapiro-Wilk test examine the null hypothesis that the data will not differ from the normal distribution (Kline, 2015). However, these tests are very strict, and it is difficult to assume the normality of data solely based on these methods. Therefore, the normality assumption was examined by ranges of skewness and kurtosis (Griffin & Steinbrecher, 2013). In general, skewness between -3 and +3, and kurtosis from a range of -10 to +10 are considered to be acceptable (Griffin & Steinbrecher, 2013). These criteria were met in the current analysis.

Furthermore, the test of sphericity was conducted to examine whether the correlation matrix is suitable for the factor analysis (Weston & Gore Jr, 2006). One such test is the Bartlett's test which can be used to examine the null hypothesis (i.e., all correlations between variables are zero; Bartlett, 1950). If the null hypothesis is rejected, then, factor analysis can be conducted. The criterion for rejecting the null hypothesis is usually set to $p < .05$ (Bartlett, 1950). Furthermore, the result from Kaiser-Meyer-Olkin (KMO) test was considered to decide the sampling adequacy (Kaiser, 1974). The KMO value closer to 1, suggests that the data is suitable for factor analyses. More specifically, values of KMO above 0.5 are generally accepted and values above 0.8 are considered favorable for factor analysis (Weston & Gore Jr, 2006). For the current study, these two criteria were also met.

2.1.4.1.1.4. Estimation Method

Various extraction methods can be employed in factor analysis, depending on the purpose of the research. To date, principal axis factoring (PAF) and maximum likelihood (ML) are the most widely used estimation methods in EFA (Kline, 2015). PAF assumes that the subjects/participants of the collected data is the population, whereas ML assumes that the subjects/participants of the collected data is the sample (Kline, 2015). In this study, ML was more appropriate than PAF because a sample correlation matrix was used to predict the population matrix. More specifically, the current study used robust maximum likelihood (MLR) methods in order to examine and correct the possible violations of multivariate normality by adjusting standard errors and fit indices (Kline, 2015).

2.1.4.1.1.5. Number of Factors

After extracting the factors, the number of factors was finally determined (Knekta et al., 2019). For the current dissertation project, in determining the number of factors in an EFA, several aspects were considered including the cumulative proportion of variance, Kaiser-Guttman rule, scree plot, Horn's parallel analysis, Minimum Average Partial (MAP) test, and theoretical background (Kahn, 2006; Weston & Gore Jr, 2006). The cumulative proportion of variance uses the proportion of variance obtained by dividing the eigenvalues by the sum of the eigenvalues. When the cumulative proportion of variance reaches a sufficiently high value as the tentative factors are added, the factor selection can be finalized. The previous studies suggested approximately 50% to 70% for the suitable proportion (Kahn, 2006; Weston & Gore Jr, 2006), and this range was used for the current dissertation project.

The Kaiser-Guttman rule, also known as the greater-than-one rule, is that if the amount of the variance of a factor is smaller than that of one variable, then the factor may not be reliable (Jackson, 1993). A scree plot is a line plot of the eigenvalues of factors, and it can be employed to determine the number of factors to be retained in an EFA (Kahn, 2006; Weston & Gore Jr, 2006). Usually, the point at which the line flattens indicates that many

factors over the point have trivial eigenvalues approximately equal to each other. Therefore, researchers can visually decide the number of factors based on this point where the slope of the curve is clearly leveling off (i.e., often referred to as “elbow”). However, finding this point through visual inspection can be sometimes subjective, and it can be difficult to determine when the curved part of the plot appears in multiple places (Kahn, 2006; Weston & Gore Jr, 2006).

Horn’s parallel analysis provides a more persuasive criterion using a scree plot (Hayton et al., 2004). In this method, a horizontal line obtained from uncorrelated random data is drawn, and a scree plot is overlaid using actual data. Only factors with eigenvalues that are above the line can be adopted, and all factors to the right where the two graphs intersect are rejected. Also, the MAP test was used to identify the optimal number of factors by finding the minimum average squared partial correlation, indicating that the chosen number of factors adequately explains the underlying structure of the data without overfitting. Finally, theoretical backgrounds will be taken into account to decide the number of factors (Weston & Gore Jr, 2006). None of the abovementioned methods provide clear-cut decision criteria and it is important to integrate the results firmly based on theories to find the ideal number of factors for psychological flexibility and inflexibility.

2.1.4.1.1.6. Rotation

The rotation method can be selected depending on the assumption of the relationship among factors (Kline, 2015). Orthogonal rotations require factors to remain separated from each other (i.e., maintain a 90-degree angle between axes) and oblique rotations allow the factors to be correlated (i.e., allow the X and Y axes to be freely estimated). When the latent factors are expected to have a significant correlation in light of the theories, it is preferable to perform the oblique rotation (e.g., promax rotation) rather than orthogonal rotation (Kline,

2015). The current study employed promax rotation since factors in psychological flexibility and inflexibility are theorized to be correlated (Hayes, Strosahl, et al., 2012).

2.1.4.1.1.7. Factor Loading

The factor loadings express the degree of association between observed variables and the underlying latent factor (Kline, 2015). They are correlation coefficients between observed variables and latent factors, which can be also regarded as standardized regression coefficients, or regression weights. Larger values of factor loadings indicate that the observed variable is better explained by the corresponding latent factor. It is generally recommended that factor loadings for individual items should be at least $|0.4|$ (Howard, 2016), as a rule of thumb. Cross loading, which is characterized by an item having factor loadings exceeding an absolute value of 0.4 for two or more factors or factor loadings linked to separate factors that do not differ by more than 0.1, is a phenomenon that should be addressed by deleting such items (Kahn, 2006; Weston & Gore Jr, 2006).

2.1.4.1.1.2. Confirmatory Factor Analysis

As previously stated, factor analysis can be categorized into two types, namely EFA and CFA, based on their intended application. EFA is employed when the underlying structure of the data cannot be assumed, as its theoretical foundation has yet to be established. The current study investigated whether the factor structure of the MPFI, as identified through EFA, could be generalized to another sample (i.e., Sample 2) by conducting CFA.

For the proposed CFA, both incremental and absolute fit indices were employed to evaluate the models. The root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) are absolute fit indices that assess how deviant a hypothesized model is from a perfect model (Browne & Cudeck, 1993). Two incremental fit indices, the comparative fit index (CFI) and the Tucker-Lewis index (TLI), compare the fit of a hypothesized model with that of a baseline model to find a model with

the worst fit. The model fit is considered to be acceptable when RMSEA and SRMR are less than 0.08 (Browne & Cudeck, 1993), and CFI (Bentler, 1990) and TLI (Bentler & Bonett, 1980) are larger than 0.9.

2.1.4.2. Measurement Invariance

Multigroup CFA is a factor analysis that examines whether the factor structures obtained from two groups are the same or significantly different by performing the same CFA among several groups (Kline, 2015). In measurement invariance, the change in model fit between the base model and the comparative model can be used (Kline, 2015). For example, scalar invariance can be held by examining the change in model fit compared to the metric invariance. The difference in chi-square change can be affected by sample size (Putnick & Bornstein, 2016). Therefore, alternative model fit indices will be also considered in the current study. More specifically, changes in CFI, RMSEA are known to be suitable criteria even with the complex model and varying sample size (Putnick & Bornstein, 2016; Van de Schoot et al., 2012). The cut-off values of .01 for the change in CFI, and .015 for RMSEA were used in the current study (Chen, 2007). The change in fit indices approaching 0 means the difference between the base model and comparison model is not significant (Van de Schoot et al., 2012).

In Study 1 of the current dissertation, among the 719 participants, the majority identified as women ($n = 521, 71.46\%$). In terms of race, approximately 35% of participants identified as “Asian,” followed by 30% as “White,” and 19% as “Multiracial.” These demographic compositions were similar to those in the aforementioned psychometric investigation with a Hawai‘i-based college sample (Spencer et al., 2022).

2.1.4.3. Item Response Theory Model

Classical test theory has certain limitations in examining individual item properties, such as item difficulty or item discrimination (Hambleton & Swaminathan, 2013). In the

current dissertation project, item response theory was employed to address these limitations of conventional item analysis. The current study utilized Generalized Partial Credit Model (GPCM; Muraki, 1992) due to its ability to provide comprehensive insights into the characteristics of items, as well as the probability of endorsing particular response categories in relation to latent trait levels. Unlike the Graded Response Model, which employs a cumulative approach, the GPCM uses an adjacent category approach, enabling to estimate the transition points between different categories (Penfield, 2014). The examination was conducted on the complete set of data in Study 1 ($n = 719$), in which the parameters of each item, including item discrimination and item thresholds, were estimated. The unidimensional GPCM analysis was performed for each subscale.

More specifically, the log-likelihood ratio test was used to select the most suitable IRT model for the present study. Two IRT models for polytomous responses were compared: the Partial Credit Model (PCM; Masters, 1982) and the GPCM. These models were applied to analyze the MPFI items, which were rated on a 6-point Likert scale. GPCM, an extension of the two-parameter logistic models, is designed to analyze responses in partially ordered categorical formats. This approach facilitates the estimation of both discrimination parameters and category parameters for polytomous items containing multiple response categories. The discrimination parameter (denoted as ' a ') holds particular significance as it quantifies an item's ability to differentiate between varying levels of the latent trait under investigation (e.g., psychological flexibility). A higher discrimination parameter indicates greater effectiveness in distinguishing respondents with high versus low levels of the latent trait (Hambleton & Swaminathan, 2013).

During the analysis using the GPCM, the θ (theta) values, representing each trait measured by each factor of MPFI, were standardized with a mean of 0 and a standard deviation of 1. For each item, six parameters were estimated, which included one

discrimination parameter and five threshold parameters. The threshold parameter (denoted as 'b') indicates the level of the trait that a respondent should possess in order to endorse a specific response category for that item. Since each item has six response categories, there were a total of five threshold parameter estimates, representing the transition points between these categories for each item.

2.1.4.3.1. Item Category Characteristics Curve

The item category characteristic curve was plotted to find the likelihood of respondents selecting a certain score on the scale (i.e., 6-point scale in MPFI) at various levels of the latent trait (e.g., defusion, self-as-context). The curves of each category were considered to be functioning well at discriminating latent traits at the peak point (Verhelst, 2010). That is, items with high discrimination parameters would have the 6 highest points on the curves (i.e., the MPFI has 6 response categories) dispersed from low levels of the latent trait to high levels of the latent trait. The modification of the original response categories was considered if some of the categories had a consistently low probability to be endorsed across items in a subscale. For example, if several trace lines in items had flattened patterns across the categories to the point where the maximum probability of each category could not be identified, then a revision of the response category was suggested.

2.1.4.3.2. Item Information Curve

The item information curve was plotted to examine how much statistical information an item gives about the latent trait measured by the participants' responses to the test items (Reise et al., 2005). Certain items may provide more information at low levels of the attribute, while others may provide more information at higher levels of the attribute. An item provides more information about respondents where it has more slope (Hambleton & Swaminathan, 2013), whereas the flat curve of an item indicates that the expected score is not

very sensitive to differentiate traits of participants. The item information curve was used to select the most informative items.

2.1.4.3.3. Test Information Curve

Since the trait of a respondent cannot be fully estimated with a single item, a test consisting of several items is often used in the actual measurement setting (Furr, 2021). While the item information function estimates the amount of information that one item has, the test information function estimates the amount of information on a set of items. It indicates how accurately the test as a whole can estimate the potential characteristics of the subject to be measured. The test information function represents the maximum amount of information that can be obtained from the response of a respondent, and the test information at a given trait level is the sum of the item information at the given trait level (Reise et al., 2005). The test information curve, which depicts the amount of information yielded by the test information function, has a very diverse form depending on the number of items, item difficulty, and item discrimination. In general, the test information curve has the maximum information at the trait level corresponding to the average value of the item difficulty, and the curve decreases as it gets further away from that point (Hambleton & Swaminathan, 2013).

2.1.4.4. Validity Evidence in Relationship with Other Constructs

Furthermore, preliminary correlation analyses were conducted between MPFI and PPF, Psy-Flex, DTS, and DASS-21 to investigate the convergent and divergent validity of MPFI. As previously stated, Cherry et al. (2021) suggested that a correlation coefficient lower than .7 indicates divergent validity. I also evaluated the divergent validity of MPFI using the criteria proposed by Cherry et al. (2021).

2.1.4.5. Final Selection of Items for the Short Version of MPFI

The final selection of items was conducted based on the result of factor analysis and IRT analysis as well as consultation with an expert in the field to ensure content validity.

Table 2.9 showed the decision criteria that was inferred in the selection process. The abbreviated version comprised a total of 36 items (MPFI-S), with three items allocated to each factor.

2.2. Results

2.2.1. Exploratory Factor Analysis

In the initial phase of examining the data from Sample 1, several assumptions for multivariate analysis, including normality (the distribution of variables), linearity (the linear relationship between variables), and homoscedasticity (the uniformity of variance across variables), were evaluated. It was confirmed that the dataset adhered to all these assumptions, indicating suitability for further analysis. An examination utilizing Mahalanobis' distance was then conducted to identify multivariate outliers within the dataset. In this analysis, 21 such observations were identified with Mahalanobis' distance values exceeding the critical threshold of $\chi^2(60) = 99.61$. These identified 21 multivariate outliers were excluded from further analyses.

Subsequently, once outliers were removed, the corrected item-total correlation and deleted Cronbach's alpha coefficient were examined for each factor to assess the reliability of MPFI (Table 2.2). While the corrected item-total correlation for other items falls within the medium to high strength range ($r_s > .6$), MPFI item 1 ("I was receptive to observing unpleasant thoughts and feelings without interfering with them") exhibited a particularly low strength ($r = .39$). This result aligns with the high deleted Cronbach's alpha ($\alpha = .84$), suggesting that this item may not significantly contribute to the overall measurement of the construct (i.e., Acceptance) being assessed.

The correlation plot between items demonstrates distinct groups characterized by strong correlations (Figure 2.1). Specifically, two broad clusters are visually evident: one indicating psychological flexibility, encompassing item 1 to item 30, and the other indicating

psychological inflexibility, covering item 31 to item 60. Within the cluster representing psychological flexibility, six subgroups were visually identified, aligning with the Hexaflex model (Hayes et al., 2006). However, the differentiation between subgroups was not as visually evident within psychological inflexibility.

To assess the suitability of the data for factor analysis, Bartlett's test of sphericity was conducted. The null hypothesis, which assumes that the correlation matrix is an identity matrix, was rejected ($\chi^2 = 16539.24$, $df = 1770$, $p < .05$), indicating that correlations between variables were sufficiently different from zero, supporting the factorability of the data. Additionally, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was calculated to evaluate the overall strength of the relationships among variables. In our analysis, the KMO value was .94, which was greater than .6, the cut-off criterion of acceptability, suggesting that the data were suitable for factor analysis.

Next, parallel analysis and minimum average partial (MAP) test were employed to determine the appropriate number of factors (Table 2.3). More specifically, applying the eigenvalue of .7 or above as the criterion, the presence of 13 components were found. Also, the parallel analysis indicates that the eigenvalues of the 11 factors in the observed data surpass the value obtained from the simulated random dataset, providing support for the 11-factor model. Additionally, the MAP test suggested retaining between 9 and 13 components (Velicer, 1976; Velicer et al., 2000). Together, these results suggest that the optimal factor structure for the current dataset can be represented by an 11-factor model (RMSEA = .05, CFI = .95), a 12-factor model (RMSEA = .04, CFI = .96), or a 13-factor model (RMSEA = .04, CFI = .97), with all three demonstrating excellent model fit.

Subsequent inspection revealed that the 11-factor model exhibited two double-loaded items (i.e., MPFI items 21 and 22) with factor loadings exceeding .4 for both latent factors. Additionally, the 13-factor model revealed a factor containing only two items (i.e., MPFI

items 1 and 2) which violated the recommended minimum number of items per factor (Kline, 2015). Consequently, the 12-factor model was selected as the final EFA model. As shown in Table 2.4, the 12-factor model achieved simple structure with each item loading on one and only one factor. Even though item 25 (i.e., “My deeper values consistently gave direction to my life.”) exhibited modest loadings on two factors, I decided to retain the item based on a stricter criterion for factor loadings of .4 (MacCallum et al., 1999; Stevens, 2012).

Furthermore, the item is of significant importance to measure the factor (i.e., Factor 5 in Table 2.4), which seemingly represents values in psychological flexibility. In summary, the results of the EFA indicate a factor structure that aligns with the theoretical framework of Hexaflex model (Hayes et al., 2006), with each factor comprising five items.

Upon the completion of EFA, each factor was named based on the Hexaflex model (Hayes et al., 2006) and original MPFI development study (Rolffs et al., 2018). Specifically, aligned with the original MPFI development study (Rolffs et al., 2018), the first factor comprises items 1 through 5, and it was labeled as *Acceptance* in the current study. As previously discussed, it represents the voluntary adoption of an intentionally open, receptive, flexible, and non-judgmental attitude towards moment-to-moment experiences. Similarly, the second factor comprises items 6 through 10 and was labeled as *Present Moment Awareness*. It refers to the intentional allocation of attention towards the ongoing physical and psychological experience. The third factor, labeled as *Self-as-Context*, includes items 11 through 15. This factor refers to viewing the self as a perspective from which personal experiences, such as thoughts and emotions, are observed. The fourth factor comprises items 16 through 20 and was labeled as *Cognitive Defusion*. This factor relates to an individual’s ability to recognize ongoing cognitive processes as distinct from their literal content, allowing them to step back and observe their thoughts objectively. The fifth factor, labeled as *Values*, includes items 21 through 25. This factor involves the identification or clarification

of the life direction or choices that an individual genuinely desires. And lastly, the sixth factor, labeled as *Committed Action*, includes items 26 through 30. This factor measures the degree to which a person effectively engages in behaviors aligned with their predetermined values and goals.

Furthermore, the remaining six factors, which were related to psychological inflexibility, were also named according to the Hexaflex model (Hayes et al., 2006) and the original MPFI development study (Rolffs et al., 2018), with each factor comprising five items. Specifically, the seventh factor, labeled as *Experiential Avoidance*, includes items 31 through 35. This factor describes the tendency to avoid certain private experiences (e.g., thoughts, emotions, memories, and sensations) and attempts to change their form or frequency and the contexts associated with them. The eighth factor, labeled as *Lack of Contact with Present Moment Awareness*, includes items 36 through 40. It refers to the inability to stay aware of current internal and external stimuli, often due to attentional rigidity. This rigidity involves fixating on a specific topic and having difficulty shifting attention and responding to ongoing experiences. The ninth factor, labeled as *Self-as-Contents*, includes items 41 through 45. This factor indicates that an individual's behavior is dominated by certain self-conceptualizations. The tenth factor, labeled as *Cognitive Fusion*, includes items 46 through 50. It refers to the dominance of verbal processes over behavioral regulation, to the extent that other regulatory stimuli (e.g., environmental context) have little influence on behavior. The eleventh factor, labeled as *Lack of Contact with Value*, includes items 51 through 55. This factor describes an individual's lack of clarity, neglect, or inconsistency in adhering to core values, which are principles or standards of behavior. Lastly, the twelfth factor, labeled as *Inaction*, includes items 56 through 60. It refers to the failure to persist effectively when continued action is needed to achieve value-based goals.

2.2.2. Confirmatory Factor Analysis

Subsequently, CFA was employed using Sample 2 ($n = 359$) to validate the factor structure of MPFI as identified in the EFA with Sample 1. To determine the most appropriate factor structure for the MPFI, a comparative analysis of CFA model fits was conducted for two versions of the scale: a 12-factor model with and without two higher-order factors. The fit indices for both 12 factor-model [Figure 2.2; $\chi^2(1644) = 3473.91, p < .001$; CFI = .93; TLI = .92; RMSEA = .05; SRMR = .04] and 12 factor-model with second-order factors [Figure 2.3; $\chi^2(1697) = 4014.77, p < .001$; CFI = .91; TLI = .90; RMSEA = .05; SRMR = .06] were within an acceptable range, indicating strong model fits. Therefore, following the *Hexaflex* model, the 12-factor model with two overarching factors was selected as the final model.

The standardized factor loadings for the second-order factor of psychological flexibility ranged from .37 to .85 ($ps < .001$) for the first factor (i.e., Acceptance), from .78 to .84 ($ps < .001$) for the second factor (i.e., Present Moment Awareness), from .77 to .87 ($ps < .001$) for the third factor (i.e., Self-as-Context), from .79 to .84 ($ps < .001$) for the fourth factor (i.e., Defusion), from .75 to .82 ($ps < .001$) for the fifth factor (i.e., Values), and from .73 to .87 ($ps < .001$) for the sixth factor (i.e., Committed Action). Additionally, the standardized factor loadings for the second-order factor of psychological inflexibility fell within the adequate range between .69 and .87 ($ps < .001$) for seventh factor (i.e., Experiential Avoidance), .74 and .92 ($ps < .001$) for eighth factor (i.e., Lack of Contact with Present Moment Awareness), .79 and .87 ($ps < .001$) for ninth factor (i.e., Self-as-Contents), .82 and .84 ($ps < .001$) for tenth factor (i.e., Fusion), .74 and .82 ($ps < .001$) for eleventh factor (i.e., Lack of Contact with Values), and .83 and .87 ($ps < .001$) for twelfth factor (i.e., Inaction). The moderate factor correlations observed between the two overarching latent factors ($r = -.52, p < .01$) suggest that these factors are related yet distinct constructs.

2.2.3. Measurement Invariance

As shown in Table 2.5, a multigroup CFA was conducted to examine whether the identified factor structure was invariant across gender (i.e., male, female) and race (i.e., Asian, Non-Hispanic White, and other ethnicities). Following the Hexaflex model of psychological flexibility (Hayes, Strosahl, et al., 2012), separate measurement invariance analyses were performed for psychological flexibility and psychological inflexibility. Specifically, four multigroup CFAs were conducted: gender-flexibility, gender-inflexibility, race-flexibility, and race-inflexibility. It was decided to exclude the “Other” gender category ($n = 11$, 1.53%) because small sample sizes can lead to low statistical power, making it difficult to detect true differences or invariances. This can result in unreliable and unstable parameter estimates, potentially skewing the results and interpretations (MacCallum et al., 1999). Similarly, due to limited numbers of participants in some racial groups (e.g., Black = 10, Latinx = 54, Native Hawaiian = 20), the participants were categorized into the following three groups: Asian ($n = 252$, 35.05%), Non-Hispanic White ($n = 219$, 30.46%), and a combined group representing other ethnicities ($n = 248$, 34.49%). This grouping was consistent with a previous psychometric validation study with a Hawai‘i-based sample of racially diverse college students (Spencer et al., 2022).

The results suggest support for invariance across these groups. For gender, the results for both psychological flexibility and inflexibility show that CFI values remained relatively stable across the configural, metric, and scalar models, and changes in CFI were minimal, indicating that the measurement model is invariant across women and men. In particular, the changes in CFI for both psychological flexibility and inflexibility were less than .005, within the cut-off criteria of .01. Additionally, RMSEA values remained largely consistent across models for psychological flexibility and inflexibility, with changes smaller than the threshold of .015, further supporting measurement invariance.

For racial groups, the results also show evidence of measurement invariance, with similar patterns observed across the three racial groups for both psychological flexibility and inflexibility. The CFI values remained stable across the configural, metric, and scalar models for psychological flexibility and inflexibility, with changes in CFI consistently below the cut-off of .01, and RMSEA changes remained within the threshold of .015. These findings indicate that the factor structures for psychological flexibility and inflexibility are largely equivalent across gender and racial groups.

2.2.4. Item Response Theory Approach

IRT analyses with the GPCM were conducted to examine the 5 items within each factor of MPFI and their corresponding response categories. The assumption of unidimensionality of the constructs was supported in the previous CFA stage. Regarding the goodness-of-fit for each item, the RMSEA values for the five items in each factor ranged from 0 to .04, indicating an acceptable fit for the respective items. Similarly, when comparing the two models (i.e., GPCM and PCM), all factors, including Acceptance [$\Delta\chi^2(4) = 156.94, p < .01$], Present Moment Awareness [$\Delta\chi^2(4) = 67.46, p < .01$], Self as Context [$\Delta\chi^2(4) = 60.93, p < .01$], Defusion [$\Delta\chi^2(4) = 20.93, p < .01$], Values [$\Delta\chi^2(4) = 31.40, p < .01$], Committed Action [$\Delta\chi^2(4) = 101.30, p < .01$], Experiential Avoidance [$\Delta\chi^2(4) = 82.98, p < .01$], Lack of Contact with Present Moment Awareness [$\Delta\chi^2(4) = 139.98, p < .01$], Self as Contents [$\Delta\chi^2(4) = 75.32, p < .01$], Fusion [$\Delta\chi^2(4) = 90.08, p < .01$], Lack of Contact with Values [$\Delta\chi^2(4) = 40.24, p < .01$], and Inaction [$\Delta\chi^2(4) = 49.09, p < .01$], supported the GPCM as the more appropriate models over the PCM.

Collectively, the test information curves showed that the twelve subscales demonstrated the highest precision with the Θ range of -2 to 2 (Figure 2.6; Figure 2.9). Additionally, item category characteristic curves showed the respondents' selection of specific response categories across different levels of related latent traits (Figure 2.5; Figure

2.8). The six response categories calibrated a broad range of Θ values. Most threshold parameter estimates followed a logical order along the latent traits, indicating that individuals with lower levels of the latent trait tended to select lower response categories, whereas those with higher levels of the latent trait tended to select higher response categories. It is worth noting that six response categories exhibited a higher likelihood of being chosen, suggesting that the number of response categories in the extant Likert scale functions effectively.

Furthermore, Table 2.6 provides item parameter estimates, explaining the extent to which each item distinguishes between varying levels of traits (e.g., acceptance, experiential avoidance) associated with psychological flexibility and inflexibility. The discrimination parameters can be categorized as very low (.01 to .34), low (.35 to .64), moderate (.65 to 1.34), high (1.35 to 1.69), or very high (1.70 or higher) to describe their effectiveness in distinguishing between trait levels (Baker & Kim, 2004).

Specifically, regarding Acceptance, MPFI 1 (“I was receptive to observing unpleasant thoughts and feelings without interfering with them”; $a = .50$) fell within the low discrimination range, while the other items ranged from moderate to high discrimination. MPFI 2 (i.e., “I tried to make peace with my negative thoughts and feelings rather than resisting them”; $a = 1.16$), MPFI 3 (i.e., “I made room to fully experience negative thoughts and emotions, breathing them in rather than pushing them away”; $a = 1.87$), and MPFI 4 (i.e., “When I had an upsetting thought or emotion, I tried to give it space rather than ignoring it”; $a = 2.37$) exhibited the highest discrimination parameters. Figure 2.4 depicts item information curves, illustrating how each item provides information across different levels of the corresponding trait. Notably, all four items except MPFI 1 were accurately discriminating the latent level of Acceptance.

For Present Moment Awareness, all items ranged from high to very high discrimination with MPFI 7 (i.e., “I was in tune with my thoughts and feelings from moment

to moment”; $a = 2.84$), MPFI 8 (i.e., “I paid close attention to what I was thinking and feeling”; $a = 3.03$), and MPFI 9 (i.e., “I was in touch with the ebb and flow of my thoughts and feelings”; $a = 3.09$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Present Moment Awareness (Figure 2.4).

For Self-as-Context, all items ranged from high to very high discrimination with MPFI 12 (i.e., “I carried myself through tough moments by seeing my life from a larger viewpoint”; $a = 2.23$), MPFI 13 (i.e., “I tried to keep perspective even when life knocked me down”; $a = 3.38$), and MPFI 14 (i.e., “When I was scared or afraid, I still tried to see the larger picture”; $a = 3.09$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Self-as-Context (Figure 2.4).

For Defusion, all items showed very high discrimination with MPFI 16 (i.e., “I was able to let negative feelings come and go without getting caught up in them”; $a = 2.45$), MPFI 17 (i.e., “When I was upset, I was able to let those negative feelings pass through me without clinging to them”; $a = 2.65$), and MPFI 20 (i.e., “In tough situations, I was able to notice my thoughts and feelings without getting overwhelmed by them”; $a = 2.05$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Defusion (Figure 2.4).

For Values, all items ranged from high to very high discrimination with MPFI 21 (i.e., “I was very in-touch with what is important to me and my life”; $a = 2.20$), MPFI 22 (i.e., “I stuck to my deeper priorities in life”; $a = 2.90$), and MPFI 23 (i.e., “I tried to connect with what is truly important to me on a daily basis”; $a = 2.30$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Values (Figure 2.4).

For Committed Action, all items showed very high discrimination with MPFI 27 (i.e., “Even when times got tough, I was still able to take steps toward what I value in life”; $a = 3.64$), MPFI 28 (i.e., “Even when life got stressful and hectic, I still worked toward things that were important to me”; $a = 4.38$), and MPFI 29 (i.e., “I didn’t let set-backs slow me down in taking action toward what I really want in life”; $a = 2.83$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Committed Action (Figure 2.4).

For Experiential Avoidance, all items ranged from high to very high discrimination with MPFI 32 (i.e., “I tried to distract myself when I felt unpleasant emotions”; $a = 2.47$), MPFI 33 (i.e., “When unpleasant memories came to me, I tried to put them out of my mind”; $a = 3.22$), and MPFI 34 (i.e., “When something upsetting came up, I tried very hard to stop thinking about it”; $a = 3.21$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Experiential Avoidance (Figure 2.7).

For Lack of Contact with Present Moment Awareness, all items showed very high discrimination with MPFI 38 (i.e., “I went through most days on auto-pilot without paying much attention to what I was thinking or feeling”; $a = 4.10$), MPFI 39 (i.e., “I floated through most days without paying much attention”; $a = 4.34$), and MPFI 40 (i.e., “Most of the time I was just going through the motions without paying much attention”; $a = 3.80$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Lack of Contact with Present Moment Awareness (Figure 2.7).

For Self-as-Content, all items showed very high discrimination with MPFI 43 (i.e., “I believed some of my thoughts are abnormal or bad and I shouldn’t think that way”; $a = 3.09$), MPFI 44 (i.e., “I told myself that I shouldn’t be feeling the way I’m feeling”; $a = 3.70$), and

MPFI 45 (i.e., “I told myself I shouldn’t be thinking the way I was thinking”; $a = 3.71$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Self-as-Contents (Figure 2.7).

For Fusion, all items ranged from high to very high discrimination with MPFI 47 (i.e., “Distressing thoughts tended to spin around in my mind like a broken record”; $a = 3.64$), MPFI 48 (i.e., “It was very easy to get trapped into unwanted thoughts and feelings”; $a = 3.85$), and MPFI 49 (i.e., “When I had negative thoughts or feelings it was very hard to see past them”; $a = 3.60$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Fusion (Figure 2.7).

For Lack of Contact with Values, all items ranged from high to very high discrimination with MPFI 52 (i.e., “When life got hectic, I often lost touch with the things I value”; $a = 2.85$), MPFI 53 (i.e., “The things that I value the most often fell off my priority list completely”; $a = 2.36$), and MPFI 55 (i.e., “When times got tough, it was easy to forget about what I truly value”; $a = 2.08$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Lack of Contact with Values (Figure 2.7).

Lastly, for Inaction, all items showed very high discrimination with MPFI 56 (i.e., “Negative feelings often trapped me in inaction”; $a = 2.91$), MPFI 57 (i.e., “Negative feelings easily stalled out my plans”; $a = 3.42$), and MPFI 58 (i.e., “Getting upset left me stuck and inactive”; $a = 3.10$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Inaction (Figure 2.7).

2.2.5. Preliminary Validity Evidence

The analysis of the correlation results provided preliminary evidence for both convergent and divergent validity. As shown in Table 2.7, the intra-cluster correlations among factors within the MPFI aligned with the Hexaflex model. Specifically, correlations among factors within the psychological flexibility cluster ranged from moderate to strong ($.40 < r_s < .76, p_s < .01$), as did those within the psychological inflexibility cluster ($.18 < r_s < .76, p_s < .01$). Notably, most psychological inflexibility factors showed strong correlations with one another, with the exception of Experiential Avoidance, which displayed smaller correlations with other factors including Lack of Present Moment Awareness ($r = .29, p < .01$) and Lack of Values ($r = .18, p < .01$). This indicates a generally high degree of coherence within the respective clusters.

The inter-cluster correlations between psychological flexibility and inflexibility factors generally ranged from small to large ($-.57 < r_s < -.11, p_s < .01$). There were a few cases where moderate or large correlations emerged, such as Defusion-Fusion ($r = -.57, p < .01$), Committed Action-Lack of Value ($r = -.48, p < .01$), Defusion-Inaction ($r = -.48, p < .01$), Committed Action-Inaction ($r = -.47, p < .01$), and Values-Lack of Value ($r = -.43, p < .01$). However, most inter-cluster correlations were small, which supports the notion that flexibility and inflexibility represent distinct but related constructs. The correlation between the higher-order psychological flexibility and inflexibility factors was moderate ($r = -.41, p < .01$), which is consistent with the latent factor correlation result (i.e., $r = -.52, p < .01$). This further suggests that while the two constructs are related, they remain distinct, with each including unique elements that contribute to the Hexaflex model.

In summary, the examination of intra-cluster and inter-cluster correlations suggests that factors (first-order factors) within each psychological flexibility and inflexibility cluster exhibit convergent validity, highlighting the internal consistency within each construct. Meanwhile, the smaller correlations between the two clusters support their divergent validity,

indicating that while they are related, they represent separate domains of psychological experience.

The analysis of convergent and divergent validity was further extended by examining the relationships between psychological flexibility and other constructs beyond the MPFI (Table 2.8). In psychological flexibility, the composite score of MPFI showed moderate to large correlations with other flexibility measures, such as PPFi ($r = .48, p < .01$) and Psy-Flex ($r = .54, p < .01$). Also, results revealed moderate associations of psychological flexibility composite score with those of DTS ($r = .43, p < .01$) and DASS ($r = -.36, p < .01$). However, somewhat unexpected findings emerged when considering the flexibility composite score and its associations with specific subscale scores of these broader measures of psychological flexibility. For example, within the PPFi, the MPFI flexibility composite score showed a relatively small correlation with the Harnessing subscale ($r = .14, p < .01$), suggesting that while capturing a broad aspects of psychological flexibility, the MPFI flexibility score would be less closely related to the harnessing component of psychological flexibility theorized and measured by the PPFi. Similarly, the composite score showed a small association with the Regulation subscale of the DTS ($r = .20, p < .01$), indicating that although psychological flexibility conceptually relates to emotional regulation (i.e., one's intentional efforts expended to alleviate distress), its association with this subscale score was not as strong as with other facets of distress tolerance (i.e., Tolerance, Absorption, and Appraisal) measured by the DTS. Moreover, within the DASS, the flexibility composite score showed small correlations with the scores of the Anxiety ($r = -.24, p < .01$) and Stress ($r = -.28, p < .01$) subscales, compared to Depression ($r = -.42, p < .01$).

More specifically, when each facet (first-order factor) within the psychological flexibility was analyzed, all facets showed moderate to strong correlations with both the PPFi composite score ($.28 < rs < .50, ps < .01$) and Psy-Flex ($.36 < rs < .47, ps < .01$), providing

evidence of convergent validity. As discussed more extensively below, this set of findings indicates that the facets of psychological flexibility are aligned with similar constructs of flexibility as captured by these scales. Notably, divergent validity is evident through the small or nonsignificant correlations between all psychological flexibility facets in the MPFI and the Harnessing subscale of the PPFi ($.08 < r_s < .19, p_s < .05$). Consistent with the present findings at the higher-order factor levels, this suggests that the facets (first-order factors) of psychological flexibility measured by the MPFI are not related to the *harnessing* facet of psychological flexibility measured by the PPFi. Additionally, when considering the relationships with the scores of DTS and DASS, the Acceptance and Present Moment Awareness facets in the MPFI showed relatively small correlations compared to other flexibility facets. Once again, as discussed more extensively below, these differential findings suggest that not all facets of psychological flexibility are equally related to emotion regulation and distress management. This differentiation emphasizes that psychological flexibility is a multifaceted construct with varying degrees of overlap with related but distinct psychological processes.

In the context of psychological inflexibility, the composite score showed moderate correlations with other flexibility measures, such as the PPFi ($r = -.38, p < .01$) and Psy-Flex ($r = -.38, p < .01$). Also, it demonstrated stronger associations with the composite scores of DTS ($r = -.57, p < .01$) and DASS ($r = .66, p < .01$). These stronger correlations suggest that psychological inflexibility, as measured by the MPFI, is more closely tied to experiences of emotional distress and difficulties in tolerating negative emotions, than psychological flexibility.

However, worth noting is that the nature of these associations varied when examining the relationships between the psychological inflexibility composite score and specific subscales of these broader measures (i.e., PPFi and Psy-Flex). For instance, within the PPFi,

the psychological inflexibility composite score of MPFI showed a strong negative correlation with the Avoidance subscale ($r = -.53, p < .01$), but it showed a nonsignificant correlation with the Harnessing subscale ($r = .06, p > .05$). This suggests that the composite psychological inflexibility score in the MPFI may primarily reflect avoidance-based tendencies, while being less related to harnessing (i.e., the extent to which a person utilizes negative emotions and thoughts constructively to solve problems related to one's value-based goals). Furthermore, when examining the DTS and DASS, the psychological inflexibility composite score showed moderate to strong correlations with each of their facets.

When each facet within the psychological inflexibility cluster is analyzed, Experiential Avoidance of the MPFI showed a small correlation with the Avoidance subscale of the PPFi ($r = -.21, p < .01$; the Avoidance subscale is a reverse-scored subscale with greater values suggesting lower levels of avoidance). This suggests that the Experiential Avoidance subscales in the MPFI and PPFi capture a similar but distinct dimension of experiential avoidance. Interestingly, the Lack of Value ($r = -.51, p < .01$) and Inaction ($r = -.54, p < .01$) facets in the MPFI showed strong correlations with the Avoidance subscale of the PPFi. Furthermore, the associations of MPFI Experiential Avoidance subscale were small or nonsignificant with the composite scores of psychological flexibility ($r = -.11$ and $r = -.07$, for the PPFi and Psy-Flex, respectively) and psychological distress ($r = .15$), but it showed a larger correlations with the composite score of DTS ($r = -.28$) as well as the Appraisal (“e.g., “my feelings of distress or being upset scare me”; $r = -.26$) and Regulation subscale of the DTS (e.g., “I’ll do anything to avoid feeling distressed or upset.”; $r = -.32, p < .01$). This suggests that Experiential Avoidance of the MPFI may be more reflective of a tendency to manage emotional discomfort through avoidance strategies.

Furthermore, other facets of psychological inflexibility in the MPFI, such as Lack of Present Moment Awareness ($r = -.38, p < .01$), Self-as-Content ($r = -.33, p < .01$), and

Cognitive Fusion ($r = -.44, p < .01$), Lack of Value ($r = -.51, p < .01$), and Inaction ($r = -.54, p < .01$) showed medium to large correlations with the Avoidance subscale in the PPFI.

Notably, each of these psychological inflexibility facets showed larger correlation with the Avoidance subscale compared to the Acceptance subscale in the PPFI (i.e., $-.24 < r_s < -.14$). Additionally, all facets, except Experiential Avoidance, show medium or large correlations with depression, anxiety, and stress as measured by DASS.

2.2.6. Final Selection of Items for Short Form of MPFI

As shown in Table 2.9, most items in the MPFI displayed acceptable psychometric properties based on factor analyses and item response theory analyses. Therefore, when selecting three items for each factor, it is important to consider not only psychometric properties but also other conceptual aspects (Rammstedt & Beierlein, 2014). Specifically, the following aspects were taken into account.

First, while the current psychometric investigation framework assumed psychological flexibility and inflexibility to be latent traits or context-independent psychological entities, rather than contextually situated behaviors (i.e., act-in-context), the pragmatic, functional, and contextual features of the items were considered during selection process. That is, key considerations involved evaluating whether the items properly align with their intended factors, and whether the items include a wide range of experiential dimensions (e.g., physical, emotional, and cognitive experiences) in a contextually meaningful manner. Second, following Cherry et al. (2021), the item selection used the criterion of definition alignment to assess whether the conceptual definition of a construct corresponded to the item content. Third, the final selection of items was based on whether an item in MPFI demonstrated discriminant features from related constructs (Cherry et al., 2021; Ong et al., 2020). The third criterion was particularly relevant to the item selection of the psychological inflexibility factors (e.g., Fusion, Inaction) that showed strong correlations with neuroticism, negative

affect, or psychological distress. Lastly, as Thomas et al. (2021) noted, some items within a factor may overlap in content, and this can arise from similar item expressions, potentially leading to a spurious method effect. As such, the final item section was made to minimize the content overlaps across selected items.

For the Acceptance items, while item 2 and item 3 had very high discriminant parameters (1.70 or higher), items 4 and 5 had moderate parameters (ranging from .65 to 1.34). Also, item 1 had a low discriminant parameter (.35 to .64). Regarding definition alignment, item 1 appeared to relate to other factor in psychological flexibility, such as Present Moment Awareness, as it includes the phrase “observing unpleasant thoughts and feelings.” In contrast, item 5 directly aligned in content with the Acceptance factor, as it mentions “opened myself to all of my feelings,” describing the voluntary adoption of an open posture towards experiences. Furthermore, item 3 and item 4 appear to overlap, as the phrases “made room” and “give it space” convey similar actions of allowing thoughts and emotions to be present without pushing them away or ignoring them. Therefore, items 2, 3, and 5 were selected for the Acceptance factor.

For Present Moment Awareness, all items exhibited either high or very high discriminant parameters. In content, all items of Present Moment Awareness were centered on the individual’s awareness, attention, or mindfulness concerning their emotions and thoughts, which aligns with its definition. While item 10 included “strived,” indicating an effort or attempt to remain mindful, the other items (item 6-9) did not seem to imply effort but rather a state of being. Item 9 highlighted the dynamic nature of thoughts and feelings, referring to their “ebb and flow,” and item 7 explicitly stated “from moment to moment,” highlighting continuous awareness over time, which could measure different aspect of present moment awareness. Therefore, the items 7, 8, and 9 were selected for Present Moment Awareness.

For Self-as-Context, all items exhibited either high or very high discriminant parameters, emphasizing the importance of maintaining a broader perspective during difficult times. It appeared that emotional contexts are presented in item 11 (feeling hurt or upset), item 14 (scared or afraid), and item 15 (painful). Among these, “hurt” and “upset” appeared to include both physical and emotional dimensions, whereas “scared or afraid” were seemingly related to fear. While the other items focused on maintaining a “broader perspective,” item 15 included a “balanced view of the situation,” implying not just a broader but also a more even-handed perspective. Both item 11 and item 13 used the term “perspective,” however, item 11 presents an emotional context, while item 13 (“life knocked me down”) presented a situational context involving major failures or unexpected hardships. Therefore, the items 11, 13, and 15 were selected for Self-as-Context.

For Defusion, all items exhibited very high discriminant parameters, describing the ability to notice ongoing cognitive and emotional processes as separate phenomena. While items 16, 17, and 18 focused on the internal experience of emotions without specific external context, item 20 specifically includes “tough situations,” providing external context. Additionally, items 16 and 17 referred to “negative feelings” in general, whereas items 19 and 20 refer to “negative thoughts and feelings,” including both cognitive and emotional domains. Both item 16 and item 17 use the term “negative feelings,” and their meanings appear to be similar. Therefore, the items 16, 19, and 20 were selected for Defusion.

For Values, all items exhibited either high or very high discriminant parameters, describing clarification of the direction or choice of life that an individual truly desires. While item 24 explicitly provided the context (i.e., prioritizing values even when it involves tough choices), the other items did not seem to explicitly address the contexts involved in prioritizing values. Item 23 presented a daily effort to connect with what is important, and

item 25 highlighted the consistent role of deeper values in giving direction to life. Therefore, the items 23, 24, and 25 were selected for Values.

For Committed Action, all items exhibited very high discriminant parameters, describing the level of persistence with which a person carries out behaviors consistent with pre-determined values and goals. These items covered a range of contexts, which is ideal for measuring different aspects of the construct. For instance, while items 26 and 29 focused on general efforts and setbacks in taking action toward goals, items 27 and 28 included broader life contexts (e.g., tough times, stressful, and hectic situations). Additionally, item 30 captured internal psychological barriers (i.e., fears and doubts). Between item 26 and item 29, item 29 appeared more specific in its expression (i.e., taking action). Similarly, between item 27 and item 28, item 28 provides a more specific context. Therefore, the items 28, 29, and 30 were selected for Committed Action.

For Experiential Avoidance, all items exhibited either high or very high discriminant parameters, describing avoidance, suppression, or distraction from negative internal experiences (e.g., thoughts, memories, emotions). Items 31 and 33 focused on memories (i.e., bad memory, unpleasant memories), while item 32 emphasized emotions (i.e., unpleasant emotions). Item 34 explicitly explicated the intensity of the effort (i.e., tried very hard) and item 35 reflected the variety of strategies (i.e., many things). To reduce content overlap and ensure that each item uniquely contributes to measuring the construct, items 32, 33, and 34 were selected to capture different facets of the avoidance behavior.

For Lack of Contact with Present Moment Awareness, all items exhibited very high discriminant parameters, describing a state where actions are performed with little conscious awareness or attention. Items 36 and 38 both described doing things on “automatic” or “auto-pilot,” suggesting a more habitual nature of actions. However, item 36 seemed to focus on the behavioral aspect, whereas item 38 addressed cognitive or emotional aspects. While items 37

and 39 used different terms, “mindlessly” and “floated through,” respectively, their meanings seemed to overlap each other. Therefore, the items 36, 38, and 39 were selected for Lack of Contact with Present Moment Awareness.

For Self-as-Content, all items exhibited very high discriminant parameters, describing negative evaluation of one’s emotions or thoughts. It appeared that while items 41, 42, and 44 primarily focus on emotions, items 43 and 45 focus on thoughts. Items 44 and 45 seemed to have a similar semantic structure, but they did not overlap each other in meaning. Compared to the other items, item 42 seemed to include perceived logical judgment. As such, the items 42, 44, and 45 were selected for Self-as-Contents.

For Fusion, all items showed very high discriminant parameters, describing that negative thoughts and feelings are difficult to detach from. It appeared that while items 46, 48, and 49 address both thoughts and feelings, items 47 and 50 focus primarily on thoughts. Compared to the other items, item 50 provided situational context (i.e., something bad happened). Item 47 used a metaphor (i.e., broken record) to illustrate the repetitive nature of distressing thoughts. Item 48 included both unwanted thoughts and feelings, indicating a broader scope of fusion. Together, the items 47, 48, and 50 were selected for Fusion.

For Lack of Contact with Values, all items exhibited either high or very high discriminant parameters, describing loss of personal values and priorities in daily life. More specifically, Items 51, 53, and 54 appeared to address a general loss of priorities and values, while items 52 and 55 captured to specific situations (i.e., “when life got hectic” and “when times got tough”). Item 53 appeared to use stronger language (i.e., “fell off my priority list completely”), indicating a total loss of values, which might be more easily recognized by respondents. Taking these into consideration, the items 52, 53, and 55 were selected for Lack of Contact with Values.

Finally, for Inaction, all items exhibited very high discriminant parameters, describing how negative emotions or experiences lead to a state of inaction and hinder progress. It appeared that items 57 and 59 focus on the impact on specific plans or goals, while items 56, 58, and 60 describe more general states of inaction without specifying plans or goals. Item 60 addresses both cognitive and emotional impacts on personal growth and engaged living. Put together, the items 57, 59, and 60 were selected for Inaction.

2.3. Interim Discussion for Study 1

The primary aim of Study 1 was to assess the structural, item-specific, and relational functioning of the original 60-item MPFI in a Hawai‘i-based sample of racially diverse college students and to propose a 36-item shortened version based on the best-performing items. To achieve these goals, the sample from Study 1 was divided into two groups, and both EFA and CFA were performed. Subsequently, the measurement invariance of the identified factor structure was tested across gender and racial groups. While this process provided information on the structural properties of the MPFI, IRT analysis was then conducted to investigate the functioning of each item. Finally, based on the structural and item-level findings, the relationships between the scores of MPFI and those of other theoretically related constructs was examined as a preliminary validity investigation. Finally, a shortened version of the MPFI (MPFI-S), consisting of 36 items, was proposed by selecting the three most appropriate items from each factor based on information of structural, item-level functioning, and relational criteria. Below are detailed discussions on these analyses in Study 1

The EFA results suggested that a 12-factor model was a good fit for the data. The five items within each factor were identical to those in the original 60-item MPFI (Rolffs et al., 2018), and factor names were maintained as used in the original version. CFA was then conducted on a separate sample to examine the model with and without higher-order factors

(i.e., psychological flexibility and inflexibility). The results indicated that both models fit the data well, but the final model, which included six subfactors representing the higher-order factors, was selected as it aligned more closely with the Hexaflex model of psychological flexibility and inflexibility (Hayes, Strosahl, et al., 2012).

Together, these findings suggest that the original MPFI factor structure is applicable to the present racially diverse sample. Importantly, the present findings also imply that the total scores for each subfactor (i.e., first-order factor) and higher-order factor can be considered valid representations of the corresponding constructs.

When the factor structure of MPFI was separately tested for measurement invariance in psychological flexibility and inflexibility domains across gender and race, the findings suggest support for invariance for both gender (i.e., women, men) and race categories (i.e., Asian American, White American, and other racial groups combined). Methodologically, for racial group comparison, Asian, Non-Hispanic White, and a combined group representing other ethnicities were used to ensure similar sample sizes (Spencer et al., 2022). These results indicate that the higher-order factors and subfactors are equally applicable across gender and racial groups. This implies that when comparing psychological flexibility and inflexibility across gender and racial groups, observed differences are more likely to reflect true differences rather than measurement error (Borsboom, 2006).

Following the investigation of the factor structure, the performance of each MPFI item was examined. Most items were found to function well in terms of validly associating with the latent traits, and the 6-point scale also performed adequately with the latent traits. For example, participants with a low latent trait of Acceptance tended to respond with low scores (e.g., “never true”) on relevant items. The original MPFI study also used IRT during its developmental stage to select items with good functioning (Rolffs et al., 2018). Similarly, Study 1 found that most items functioned well, indicating that the MPFI performs effectively

at the item level in a racially diverse sample. However, results revealed that one item, namely MPFI 1 (“I was receptive to observing unpleasant thoughts and feelings without interfering with them”) in the Acceptance first-order factor, had a lower discrimination parameter (i.e., $a = .5$) compared to the other items in that factor. This can be understood in light of the content of MPFI 1, which focuses on observing internal experiences, whereas the other four items in the Acceptance factor address how to engage with internal experiences (e.g., MPFI 2, “make peace with my negative thoughts and feelings”).

Finally, the analysis of validity evidence based on the relationship with other constructs suggests the convergent and divergent validity of the MPFI scores. In terms of convergent validity, the first-order factors within the psychological flexibility and inflexibility clusters generally demonstrated strong consistency. More specifically, the effect sizes of correlations among first-order factors within the same cluster, such as those within the psychological flexibility and inflexibility, were generally medium or large, supporting the within coherence of these constructs. However, the correlations between the two clusters were small to medium, particularly among conceptually relevant factors, such as Acceptance-Experiential Avoidance, Present Moment Awareness-Lack of Awareness, and Values-Lack of Value pairs, suggesting that psychological flexibility and inflexibility are related, and yet distinct constructs. This distinction is further corroborated by the moderate negative correlation between the higher-order psychological flexibility and inflexibility factors, indicating that while sharing some overlapped features, they remain distinct with each contributing unique elements to the overall Hexaflex model (Hayes, Barnes-Holmes, et al., 2012; Rolffs et al., 2018; Stabbe et al., 2019). Of note, although statistically insignificant, Experiential Avoidance within psychological inflexibility showed positive associations with several factors of psychological flexibility (Self-as-Context, $r = .04$; Values, $r = .05$;

Committed Action, $r = .05$). These anomalous findings were further examined in Study 2 and are discussed in detail in the general discussion section.

Furthermore, the relationships between psychological flexibility and inflexibility constructs and other established measures (i.e., FFPI and Psy-Flex) provide additional evidence for both convergent and divergent validity. Psychological flexibility of MPFI was moderately to strongly correlated with the composite scores of other flexibility measures, such as PPFi and Psy-Flex, demonstrating that the MPFI captures a similar underlying construct of psychological flexibility. However, once again, statistically significant but relatively small correlations were found with specific subscales of PPFi, such as the Harnessing subscale in PPFi, suggesting that the MPFI's flexibility composite may not fully overlap with these specific dimensions of psychological flexibility measured by other validated measures of psychological flexibility.

Finally, as predicted, psychological inflexibility of MPFI was more strongly correlated with emotional distress measures, including DASS, indicating that higher levels of inflexibility are closely associated with increased emotional distress. However, it is important to highlight that the strength of their correlations remain below .7, indicating that the construct of psychological inflexibility measured by the MPFI is qualitatively distinct from emotional distress measured by the DASS, offering preliminary evidence of divergent validity of psychological inflexibility measured by the MPFI (Arch et al., 2022; Bond et al., 2011; Rochefort et al., 2018; Wolgast, 2014).

In sum, the findings from Study 1 are preliminary, but provide strong support for the structural validity, item functioning, and measurement invariance of the MPFI in the present racially diverse sample in Hawai'i. The 12-factor with two higher-order factor model identified through EFA and confirmed through CFA demonstrates that the MPFI maintains a factor structure that is applicable across different gender and racial group categories

examined in Study 1. Furthermore, the IRT analysis indicates that most items perform well at the item level, and the findings also highlight the related, but distinct nature of psychological flexibility and inflexibility, with the scores of MPFI showing convergent and divergent validity through their correlations with other established measures. Finally, results of Study 1 suggest that the items of the MPFI with the present sample were psychometrically sound to preliminarily develop a shortened 36-item version, using the most effective items from each factor and careful content review. The shorter version provides a more concise tool for assessing psychological flexibility and inflexibility.

3. Study 2

3.1. Method

3.1.1. Participants

Study 2 collected 698 participants from the University of Hawai‘i. For more details about the participant recruitment process, please refer to the Method section in Study 1. The average age of participants was 19.79 years ($SD = 3.63$) and a majority of participants were female (72.72%, $n = 504$). In terms of sexual identity, most participants identified as heterosexual (77.92%, $n = 540$). The largest racial groups were Asian (36.94%, $n = 256$), White (29.72%, $n = 206$), and Biracial/Multicultural (15.87%, $n = 110$). Regarding family background, most participants came from middle-class (44.87%, $n = 311$) and working-class (23.23%, $n = 161$) backgrounds.

3.1.2. Procedure

The data was collected from a range of undergraduate psychology classes (e.g., Introduction to Psychology, Research Methods, Developmental Psychology, Abnormal Psychology, etc.) between 2023 November and 2024 December at the University of Hawai‘i at Manoa following the procedure described in Study 1.

3.1.3. Measure

Participants in Study 2 completed the demographic form that is identical to the one used in Study 1 as well as the MPFI, PPFi, PsyFlex, DTS, and DASS-21. Additionally, the following measures were added to Study 2 to investigate the above-mentioned study aims.

3.1.3.1. The Questionnaire on Self-Transcendence

The Questionnaire on Self-Transcendence (QUEST; Fishbein et al., 2022) consists of 21 items designed to measure trait self-transcendence (see Appendix G). The QUEST has three subscales, including (a) observing self, (b) inter-transcendence, and (c) distancing. The observing self factor relates to a sense of consistent aspect of oneself that observes and experiences life (e.g., “I see a connection between who I am at all places and times”). Inter-transcendence relates to a sense of connection to other beings (e.g., “I feel connected to all living beings, including plants and animals”). Distancing refers to reduced identification with one’s thoughts and feelings as being integral to the self (e.g., “I allow my emotions to come and go without struggling with them”). To calculate subscale scores, relevant items are summed, and the total score is derived by summing the subscale scores. A seven-point Likert scale is employed to score each item with (1) never true, (2) very rarely true, (3) seldom true, (4) sometimes true, (5) often true, (6) almost always true, and (7) always true. In the original development study, the evidence of construct validity was supported by bi-factor model consisted of abovementioned three facets (Fishbein et al., 2022). Additionally, the measure showed reliable internal consistency, with McDonald’s ω ranging from 0.78 to 0.91 for each of these factors (Fishbein et al., 2022). Furthermore, the measure exhibited validity evidence through its relationship with other pertinent constructs, such as decentering, defusion, mindfulness, and well-being (Fishbein et al., 2022). The Cronbach’s alphas in this sample were .78 for observing self, .73 for inter-transcendence, .83 for distancing.

3.1.3.2. The Cognitive Fusion Questionnaire

The Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014) consists of 7 items designed to measure the degree to which an individual is entangled or fused with their thoughts, making it challenging to observe thoughts as mere mental events rather than absolute truths (see Appendix H). This questionnaire is unidimensional, and sample items include “I get so caught up in my thoughts that I am unable to do the things that I most want to do.” The total score is calculated by summing all item scores. A seven-point Likert scale is employed to score each item with (1) never true, (2) very seldom true, (3) seldom true, (4) sometimes true, (5) frequently true, (6) almost always true, and (7) always true. The construct validity of CFQ was supported with its unidimensional factor structure (Dionne et al., 2016). Furthermore, the measure has displayed reliable internal consistency, with Cronbach’s alpha of .91 (Dionne et al., 2016). Additionally, the measure has exhibited discriminant validity evidence through its relationship with measure of automatic negative thoughts (Krafft & Levin, 2021). The Cronbach’s alpha in this sample was .92.

3.1.3.3. The Engaged Living Scale

The Engaged Living Scale (ELS; Trompetter et al., 2013) is a self-report questionnaire consisting of 16 items designed to evaluate an individual’s engaged living and alignment with their values (see Appendix I). The ELS has two subscales including valued living and life fulfillment. The valued living factor relates to the process of connecting with chosen values (e.g., “I have values that give my life more meaning”) and life fulfillment subscale is consistent with the process of committed action (e.g., “I live the way I always intended to live”). To determine subscale scores, relevant items are summed, and the total score is calculated by summing the scores of the subscales. A seven-point Likert scale is employed to score each item with (1) completely disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, (5) completely agree. Extant literature indicated evidence of construct validity with abovementioned two factor structure (Navarrete et al., 2023). Furthermore, the

measure has displayed reliable internal consistency, with Cronbach's alphas ranging from .70 to .91 for each of these factors (Navarrete et al., 2023). Additionally, the measure has exhibited validity evidence through its relationship with other pertinent constructs, such as life satisfaction, subjective happiness, and perceived stress (Navarrete et al., 2023). The Cronbach's alphas in this sample were .78 for valued living and .81 for life fulfillment.

3.1.3.4. The Big Five Inventory-Neuroticism

The Neuroticism subscale in Big Five Inventory (BFI-N; John et al., 1991) is a 8-item self-report scale designed to measure neuroticism (see Appendix J). Participants use a 5-point scale to rate statements about themselves (e.g., "Worries a lot," "Gets nervous easily") with response options ranging from 1 (disagree strongly) to 5 (agree strongly). The total score is computed by summing the scores for all the items. Previous research showed evidence of construct validity with its unidimensional factor structure of neuroticism subscale (Denissen et al., 2008). Also, the measure has displayed reliable internal consistency, with Cronbach's alpha of .86 (Denissen et al., 2008). Additionally, the measure has exhibited validity evidence through its relationship with other pertinent constructs, such as self-esteem, social desirability, and optimism (Worrell & Cross Jr, 2004). The Cronbach's alpha in the current sample was .83.

3.1.3.5. The Positive and Negative Affect Schedule-Negative Affect Subscale

The negative affect subscale in Positive and Negative Affect Schedule (PANAS-N; Thompson, 2007) is a 10-item self-report scale designed to measure negative affect (see Appendix K). Participants are instructed to indicate the extent to which they generally feel a certain way, on average, using a scale ranging from 1 (not at all) to 5 (extremely), in response to various adjectives (e.g., "afraid," "upset"). The total score is obtained by summing the scores for all the individual items. The unidimensional factor structure of PANAS-N supported the construct validity (Merz et al., 2013). Furthermore, the measure has displayed

adequate internal consistency, with Cronbach's alpha of .87 (Merz et al., 2013). Additionally, the measure has exhibited validity evidence through its relationship with other pertinent constructs, such as depression and anxiety (Díaz-García et al., 2020). The Cronbach's alpha in the current sample was .89.

3.1.4. Data Analysis

3.1.4.1. Factor Analysis

Based on the refinement of the items selected from the entire 60 items in the original MPFI, the CFA for the MPFI-S was conducted to examine whether the identified factor structures (e.g., 6 factors for psychological flexibility and 6 factors for psychological inflexibility) were reproduced. The model fit indices that were used in Study 1 were employed for the decision criteria in this part of Study 2.

3.1.4.2. IRT Examination

Item categories and item information were examined following the procedures reported in Study 1.

3.1.4.3. Comparison with the original MPFI

The shortened MPFI-S was compared with the original MPFI in several ways. First, the CFA fits between the original scale and the shortened one were compared to verify whether they had similar factor structures. Second, the profile of each factor was examined to find whether the MPFI-S showed similar results to the original one despite the reduced number of items (Girard et al., 2010). The profile was created using the average value of each factor. The average score of an individual was obtained by dividing the total score of each individual's corresponding subscale by the number of items for the relevant factor. The profile score for the factor was calculated by the sum of all factor average scores of individuals divided by the number of respondents. It can be argued that the two scales measure similar constructs if the difference between the profile scores of the original scale

and the shortened one is not substantial. And lastly, the bias index, which is the average difference between the latent traits obtained through IRT analysis of the original test and the shortened test, was employed (Colledani et al., 2018). A lower value in this index means that the latent traits obtained through the shortened test are close to those obtained from the original test. The bias index for each factor was determined by calculating the average of the absolute theta values of participants. The second and third approaches were designed to descriptively examine the differences between the 60-item original MPFI and the 36-item MPFI-S. Specifically, the second approach focused on comparing the observed mean scores of the factors, offering a straightforward descriptive analysis of how well the shortened version mirrored the original in terms of raw scores. The third approach, using the bias index, provided a more nuanced examination by comparing the estimated theta values for each factor, which reflect the underlying latent traits.

3.1.4.4. Convergent and Divergent Validity

As noted above, based on the findings of Study 1, 12 factors were expected to emerge from the MPFI-S. In Study 2, in addition to the measures used in Study 1, more measures of the key facets of psychological flexibility/inflexibility were included to investigate both convergent and divergent validity of the MPFI-S further. It is important to note that, for the validity investigation of MPFI-S, it would be ideal to compare the scores of 12 factors in the MPFI (6 factors associated with psychological flexibility and 6 factors with psychological inflexibility) with the scores of these distinct 12 factors measured by other psychometrically validated instruments (e.g., a psychometrically validated measure of self-as-context). However, to the best of my knowledge, such measures, other than the original MPFI, have not been developed (Arch et al., 2022; Cherry et al., 2021; Ong et al., 2020).

Alternatively, it is possible to compare the scores of 12 facets in MPFI-S with those of three overarching dimensions of psychological flexibility and inflexibility following the

tripartite model of psychological flexibility (Hayes et al., 2011). As noted previously, the tripartite model categorizes factors of psychological flexibility into three overarching domains, namely *open* (acceptance and defusion), *centered* (present moment awareness and self-as-context), and *engaged* (values and committed action) response styles. In other words, together with the Psy-Flex, PPFi, the CFQ (Gillanders et al., 2014), QUEST (Fishbein et al., 2022), and ELS (Trompetter et al., 2013) cover the all aspects of psychological flexibility and inflexibility following the tripartite conceptual framework of psychological flexibility and inflexibility (e.g., the open, centered, and engaged aspect of psychological flexibility).

Psychometrically, the CFQ, QUEST, and ELS were used as additional tools to assess the convergent and divergent validity of the MPFI-S for several additional reasons. First, as noted above, these scales have undergone rigorous psychometric investigation for their validity and reliability. Second, on examining the correspondence between the items in the MPFI-S and those in these respective measures, the contents and expressions of each item do not significantly overlap. This reduces the likelihood of method effects arising from similar wording (Podsakoff et al., 2012). Finally, these measures demonstrate a strong alignment with the aforementioned tripartite model of psychological flexibility (Hayes et al., 2011), making them particularly relevant to comparing the expected 12 facets of MPFI-S with these overarching facets of psychological flexibility/inflexibility.

Furthermore, to examine whether the facets of psychological flexibility and inflexibility are qualitatively distinct from negative affect and neuroticism (Broman-Fulks et al., 2021; Tyndall et al., 2019; Wolgast, 2014), the BFI-N (John et al., 1991) and PANAS-N (Thompson, 2007) were included as a set of additional measures to explore divergent validity of MPFI-S further. As discussed extensively elsewhere (Rochefort et al., 2018), the BFI-N and PANAS-N are the measures of choice for neuroticism and negative affect.

3.2. Results

3.2.1. Factor Structure

Study 1 established a factor structure consisting of 12 factors and two higher-order factors. Study 2 investigated whether the MPFI-S also displayed this same factor structure. The model fit statistics suggest a good fit to the data [Figure 3.1; $\chi^2(581) = 1597.63, p < .001$; CFI = .92; TLI = .92; RMSEA = .05; SRMR = .06]. The parameter estimates showed strong relationships between the observed indicators and their respective latent factors, with all coefficients being statistically significant ($p < .001$). The standardized factor loadings were generally high, suggesting that the observed variables contribute significantly to their latent factors.

For the second-order factor of psychological flexibility, the standardized factor loadings ranged from .72 to .74 ($ps < .001$) for Acceptance, from .78 to .81 ($ps < .001$) for Present Moment Awareness, from .73 to .80 ($ps < .001$) for Self as Context, from .76 to .83 ($ps < .001$) for Defusion, from .76 to .81 ($ps < .001$) for Value, and from .75 to .82 ($ps < .001$) for Committed Action. For the second-order factor of psychological inflexibility, the standardized factor loadings ranged from .76 to .87 ($ps < .001$) for Experiential Avoidance, from .67 to .89 ($ps < .001$) for Lack of Contact with Present Moment Awareness, from .74 to .91 ($ps < .001$) for Self as Contents, from .78 to .89 ($ps < .001$) for Fusion, from .83 to .86 ($ps < .001$) for Lack of Contact with Values, and from .82 to .87 ($ps < .001$) for Inaction. Also, the correlation between the two higher-order factors, psychological flexibility and psychological inflexibility, was negative and statistically significant ($r = -.46, p < .01$), indicating an inverse relationship between these factors.

3.2.2. IRT Analysis

Following the analysis conducted in Study 1, the GPCM was used to assess the three items within each factor of the MPFI-S and their associated response categories. The assumption of unidimensionality for the constructs was confirmed in the previous CFA stage.

Regarding the goodness-of-fit for each item, the RMSEA values for the three items within each factor ranged from 0 to .08, suggesting an acceptable fit for the items.

Similarly, when comparing the two models (i.e., GPCM and PCM), all factors, including Acceptance [$\Delta\chi^2(2) = 18.44, p < .01$], Present Moment Awareness [$\Delta\chi^2(2) = 6.49, p < .05$], Self as Context [$\Delta\chi^2(2) = 7.81, p < .05$], Defusion [$\Delta\chi^2(2) = 10.147, p < .01$], Values [$\Delta\chi^2(2) = 6.38, p < .05$], Committed Action [$\Delta\chi^2(2) = 16.38, p < .01$], Experiential Avoidance [$\Delta\chi^2(2) = 20.91, p < .01$], Lack of Contact with Present Moment Awareness [$\Delta\chi^2(2) = 70.86, p < .01$], Self as Contents [$\Delta\chi^2(2) = 115.11, p < .01$], Fusion [$\Delta\chi^2(2) = 41.88, p < .01$], Lack of Contact with Values [$\Delta\chi^2(2) = 17.395, p < .01$], and Inaction [$\Delta\chi^2(2) = 33.03, p < .01$], supported the GPCM as more appropriate model than the PCM.

Consistent with the results from Study 1, the test information curves showed that the factors of psychological flexibility (Figure 3.4) and psychological inflexibility (Figure 3.7) exhibited the highest precision within the Θ range of -2 to 2. Additionally, the item category characteristic curves indicated that the six response categories covered a wide range of Θ values for both psychological flexibility (Figure 3.3) and psychological inflexibility (Figure 3.6), and most threshold parameter estimates indicated that individuals with lower levels of the latent trait tended to select lower response categories, whereas those with higher levels of the latent trait tended to select higher response categories. Furthermore, the six response categories exhibited a higher likelihood of being chosen, suggesting that the number of response categories in the extant Likert scale functions effectively.

Table 3.2 provides item discrimination parameters as well as item threshold parameters for factors in psychological flexibility and inflexibility. Following Study 1, The discrimination parameters can be categorized as very low (.01 to .34), low (.35 to .64), moderate (.65 to 1.34), high (1.35 to 1.69), or very high (1.70 or higher) for their effectiveness (Baker & Kim, 2004).

Within the psychological flexibility domain, all items ranged from moderate to very high discrimination for Acceptance, with MPFI 3 (i.e., “I made room to fully experience negative thoughts and emotions, breathing them in rather than pushing them away”; $a = 2.49$), exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Acceptance (Figure 3.2). With respect to Present Moment Awareness, all items ranged from high to very high discrimination with MPFI 8 (i.e., “I paid close attention to what I was thinking and feeling”; $a = 2.32$), exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Present Moment Awareness (Figure 3.2). Regarding Self-as-Context, all items ranged from high to very high discrimination with MPFI 13 (i.e., “I tried to keep perspective even when life knocked me down”; $a = 1.82$), exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Self-as-Context (Figure 3.2). For Defusion, all items ranged from high to very high discrimination with MPFI 19 (i.e., “I was able to step back and notice negative thoughts and feelings without reacting to them”; $a = 2.35$) exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Defusion (Figure 3.2). With respect to Values, all items showed very high discrimination with MPFI 24 (i.e., “Even when it meant making tough choices, I still tried to prioritize the things that were important to me”; $a = 2.18$) exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Values (Figure 3.2). Finally, for Committed Action, all items ranged from high to very high discrimination with MPFI 29 (i.e., “I didn’t let set-backs slow me down in taking action toward what I really want in life”; $a = 2.71$) exhibiting the highest discrimination parameter. The item information

curves illustrate that these items accurately discriminate the latent level of Committed Action (Figure 3.2).

Within the psychological inflexibility domain, for Experiential Avoidance, all items ranged from high to very high discrimination with MPFI 33 (i.e., “When unpleasant memories came to me, I tried to put them out of my mind”; $a = 3.20$) exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Experiential Avoidance (Figure 3.5). Regarding Lack of Contact with Present Moment Awareness, all items ranged from moderate to very high discrimination with MPFI 38 (i.e., “I went through most days on auto-pilot without paying much attention to what I was thinking or feeling”; $a = 3.80$) exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Lack of Contact with Present Moment Awareness (Figure 3.5). For Self-as-Contents, all items ranged from moderate to very high discrimination with MPFI 44 (i.e., “I told myself that I shouldn’t be feeling the way I’m feeling”; $a = 4.57$) exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Self-as-Content (Figure 3.5). With respect to Fusion, all items ranged from high to very high discrimination with MPFI 48 (i.e., “It was very easy to get trapped into unwanted thoughts and feelings”; $a = 3.71$) exhibiting the highest discrimination parameters. The item information curves illustrate that these items accurately discriminate the latent level of Fusion (Figure 3.5). For Lack of Contact with Values, all items showed very high discrimination with MPFI 53 (i.e., “The things that I value the most often fell off my priority list completely”; $a = 3.36$) exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Lack of Contact with Values (Figure 3.5). Lastly, for Inaction, all items showed very high discrimination with MPFI 60 (i.e., “Unpleasant thoughts and

feelings easily overwhelmed my efforts to deepen my life”; $a = 3.63$) exhibiting the highest discrimination parameter. The item information curves illustrate that these items accurately discriminate the latent level of Inaction (Figure 3.5).

3.2.3. Comparison between Original and Short Form

The model fits of the original 60-item MPFI and the shortened 36-item MPFI-S were compared using CFA with higher-order factors of psychological flexibility and psychological inflexibility. The original model exhibited good fit indices, $\chi^2(1697) = 3721.32, p < .001$; CFI = .90; TLI = .90; RMSEA = .05; SRMR = .06. Also, the shortened model exhibited good fit indices $\chi^2(581) = 1597.63, p < .001$; CFI = .92; TLI = .92; RMSEA = .05; SRMR = .06. While both models displayed similarly low RMSEA and SRMR values, suggesting adequate fit, the shortened form achieved higher CFI and TLI values, indicating a marginally better model fit compared to the original form.

The comparison of the profile (average factor scores) between the MPFI and MPFI-S revealed notable similarities across the factors (Figure 3.8). While slight variations were observed in certain factors (e.g., Acceptance showed a marginal increase from 3.60 in the original form to 3.71 in the shortened version), for the majority of factors, the scores for the original and shortened forms were quite comparable. For example, Defusion remained almost identical, with scores of 3.38 for the original and 3.38 for the shortened form. Overall, the profiles of both forms were relatively consistent, with small variations in some areas that are likely to reflect the reduction in items.

The bias index was computed to evaluate the difference in Θ estimates between the MPFI and MPFI-S scales, with lower values indicating less bias (Figure 3.9). Specifically, within the psychological flexibility domain, the bias remained unchanged at .72 for both the original and shortened versions, indicating a minimal difference in theta estimates between the two forms for Acceptance. For Present Moment Awareness, the bias decreased from .74

(original) to .72 (short), suggesting a small reduction in the parameter estimates, with the shortened version having slightly better results. For Self-as-Context, the bias decreased from .74 (original) to .71 (short), indicating a small reduction in bias with the shortened scale. For Defusion, the bias decreased from .75 (original) to .73 (short), demonstrating a slight reduction in bias. For Values, the bias decreased from .75 (original) to .73 (short), demonstrating a slight reduction in bias. For Committed Action, the bias decreased from .75 (original) to .74 (short), demonstrating a slight reduction in bias.

Moreover, within the psychological inflexibility domain, the bias remained unchanged at .73 for both the original and shortened versions, indicating a minimal difference in Θ estimates between the two forms for Experiential Avoidance. For Lack of Contact with Present Moment Awareness, the bias remained unchanged at .75 for both the original and shortened versions. For Self-as-Content, the bias remained unchanged at .74 for both the original and shortened versions. For Fusion, the bias remained unchanged at .75 for both the original and shortened versions. For Lack of Contact with Values, the bias decreased slightly from .76 (original) to .75 (short), reflecting a small reduction in bias. Lastly, for Inaction, the bias decreased from .76 (original) to .75 (short), reflecting a small reduction in bias. Overall, the shortened MPFI form generally resulted in a small decrease in bias across most factors, indicating that the item reduction had a modest impact on the parameter estimates while maintaining comparable accuracy across the majority of the factors.

3.2.4. Validity Evidence within the MPFI-S

Firstly, the correlation results for the MPFI-S factors show that the six psychological flexibility factors (MPFI-S-1 to MPFI-S-6) were strongly positively correlated with each other, suggesting that these factors together represent a broader construct of psychological flexibility (Table 3.3). For instance, MPFI-S-1 (Acceptance) correlates highly with MPFI-S-2

(Present Moment Awareness, $r = .58, p < .01$), MPFI-S-3 (Self as Context, $r = .51, p < .01$), and MPFI-S-4 (Defusion, $r = .49, p < .01$).

On the other hand, the correlations between the psychological flexibility factors (MPFI-S-1 to MPFI-S-6) and the psychological inflexibility factors (MPFI-S-7 to MPFI-S-12) *generally* revealed negative relationships. This negative correlation is consistent with the conceptual division between flexibility and inflexibility (Ciarrochi et al., 2014; Rolffs et al., 2018; Stabbe et al., 2019), where higher psychological flexibility is associated with lower psychological inflexibility.

Interestingly, MPFI-S-7 (Experiential Avoidance), a core factor of psychological inflexibility, shows a complex pattern of correlations with psychological flexibility factors. More specifically, while it has expected negative correlations with the flexibility factors, such as MPFI-S-1 (Acceptance, $r = -.09, p < .05$) and MPFI-S-2 (Present Awareness, $r = -.02, p > .05$), it shows small, and yet positive correlations with specific psychological flexibility sub-factors, including MPFI-S-3 (Self as Context, $r = .09, p < .05$), MPFI-S-5 (Values, $r = .10, p < .01$), and MPFI-S-6 (Committed Action, $r = .15, p < .01$).

Furthermore, the negative correlations between the psychological flexibility and psychological inflexibility factors found in Study 2 support the conceptual position that these constructs are oppositional, but not perfectly so (Ciarrochi et al., 2014; Rolffs et al., 2018; Stabbe et al., 2019). More specifically, MPFI-S-PF (Flexibility) is negatively correlated with MPFI-S-PI (Inflexibility, $r = -.35, p < .01$), which supports the conceptual framework that psychological flexibility and inflexibility are inversely related. However, the strength of this correlation suggests that the two constructs may not be strictly orthogonal, while they are related to each other, allowing for some qualitative overlap among their components.

3.2.5. Validity Evidence based on the Relationship with the Scores of Other Measures

Subsequently, Table 3.4 shows the results of correlations between the MPFI-S factors and related constructs. Firstly, following Study 1, the relationships between the MPFI-S factors and the scores of the PPFi, Psy-Flex, and DTS, as well as DASS were examined. As shown in Table 3.4., the psychological flexibility factors generally show positive correlations with PPFi subscales that are conceptually related. For example, MPFI-S-1 (Acceptance) is positively correlated with PPFi-ac (Acceptance, $r = .38, p < .01$), which is expected given that both are purported to measure acceptance, a core aspect of psychological flexibility. Also, moderate negative associations were observed between most of the psychological inflexibility factors and PPFi subscales. For example, MPFI-S-11 (Lack of Values) shows negative correlations with PPFi-av (Avoidance, $r = -.44, p < .01$), and PPFi-ac (Acceptance, $r = -.24, p < .01$). These trends also appeared in the relationship between MPFI factors and distress tolerance. Furthermore, MPFI-S-PF (Flexibility) demonstrates the highest correlation with Psy-Flex ($r = .63, p < .01$), suggesting a theoretical coherence of convergence between the scores (i.e., MPFI-S-PF and Psy-Flex).

A closer look at specific MPFI-S factors reveals some interesting findings. MPFI-S-1 (Acceptance) shows a stronger correlation with PPFi-ac (Acceptance, $r = .38, p < .01$) compared to the other MPFI-S factors. The correlation between MPFI-S-1 and PPFi-ac is among the highest, indicating that the acceptance factor in MPFI-S aligns well with that of PPFi, suggesting the theoretically coherent convergence between the two. Notably, this correlation is stronger than those of PPFi-ac with other MPFI-S factors, such as MPFI-S-2 (Present Awareness, $r = .33, p < .01$), highlighting that MPFI-S-1 is closely related to the construct of acceptance more so than other MPFI-S dimensions.

Additionally, as noted above, it was found that the relationship between MPFI-S-PF (Flexibility) and Psy-Flex shows the strongest positive correlation, highlighting a high degree of conceptual/qualitative alignment between these two measures of psychological flexibility.

Interestingly, the MPFI-S-PF subfactors, such as MPFI-S-1 (Acceptance, $r = .44, p < .01$) and MPFI-S-2 (Present Awareness, $r = .41, p < .01$), show weaker correlations with Psy-Flex than MPFI-S-PF, supporting the position that the score of MPFI-PF reflect a broader and higher-order construct of psychological flexibility.

With respect to the divergent validity of MPFI-S, The MPFI-S factors also show discriminant pattern with psychological distress measure. The correlations between the flexibility factors and the DASS factors range from moderate to weak. For instance, MPFI-S-1 (Acceptance) shows a weak negative correlation with DASS-D (Depression, $r = -.18, p < .01$) and DASS-A (Anxiety, $r = -.17, p < .01$), while MPFI-S-PF (Flexibility) has a moderate negative correlation with DASS-D (Depression, $r = -.36, p < .01$) and DASS-S (Stress, $r = -.32, p < .01$). The MPFI-S inflexibility domains generally show positive correlations with the DASS factors. For example, MPFI-8 (Lack of Awareness) and MPFI-S-9 (Self as Contents) show moderate positive correlations with DASS measures, such as DASS-D (Depression, $r = .41, p < .01$ for Lack of Awareness) and DASS-A (Anxiety, $r = .39, p < .01$ for Self as Contents). Interestingly, MPFI-S-11 (Lack of Values, $.40 \leq r \leq .52, p < .01$) and MPFI-S-12 (Inaction, $.49 \leq r \leq .61, p < .01$), show stronger positive correlations with all DASS factors, although the correlation coefficients did not exceed .7. In other words, these results provide evidence that the MPFI-S factors are distinct from psychological distress measures, supporting their divergent validity.

In addition to the previously mentioned measures, several additional measures of pertinent constructs were incorporated in Study 2, including the PANAS, BFI, QUEST, CFQ, and ELS. As expected, the relationships between MPFI-S factors and measures of neuroticism (BFI-neu) and negative affect (PANAS-ne) show discriminant patterns found in the original MPFI study (Rolffs et al., 2018). More specifically, MPFI-S factors related to psychological inflexibility, such as MPFI-S-7 (Experiential Avoidance) and MPFI-S-12

(Inaction), show positive correlations with BFI-neu ($r = .14$ and $r = .54$, respectively) and PANAS-ne ($r = .11$ and $r = .53$, respectively). In contrast, MPFI-S factors associated with psychological flexibility, such as MPFI-S-2 (Present Awareness), MPFI-S-3 (Self as Context), and MPFI-S-6 (Committed Action), have negative correlations with BFI-neu ($r = -.19$, $r = -.36$, and $r = -.32$, respectively) and PANAS-ne ($r = -.12$, $r = -.17$, and $r = -.24$, respectively). These findings suggest that higher psychological flexibility is associated with lower levels of neuroticism and negative emotionality, while individuals who score higher on psychological inflexibility tend to experience greater neuroticism and negative affect. However, once again, these findings also suggest that the MPFI-S factors are qualitatively distinct from negative affect or neuroticism.

Finally, Study 2 examined the convergent and divergent validity of MPFI-S factors relative to specific dimensions of psychological flexibility and inflexibility measured by the QUEST (Fishbein et al., 2022), CFQ (Gillanders et al., 2014), and ELS (Trompetter et al., 2013). As expected, the relationship between the QUEST subscales and the MPFI factors is particularly strong with MPFI-S-2 (Present Awareness) and MPFI-S-3 (Self as Context) compared to other MPFI-S factors. The QUEST subscales, such as QUEST-di (Distancing), QUEST-ob (Observing Self), and QUEST-tr (Inter-Transcendence), are purported to measure one's perceived level of own ability for transcendent or detached awareness, which aligns closely with the concepts of present moment awareness and self-as-context in the Psychological Flexibility model (Hayes et al., 2011). For instance, the composite score of QUEST shows a positive correlation with MPFI-S-2 ($r = .46$, $p < .01$) and MPFI-S-3 ($r = .55$, $p < .01$), indicating that individuals who engage more in self-distancing (a form of mindful awareness) tend to exhibit greater present awareness and a stronger sense of self-as-context.

Furthermore, there is a strong correlation between the score of CFQ, a measure of cognitive fusion, and that of MPFI-S-10 (Fusion) ($r = .71$, $p < .01$), suggesting significant

overlap between cognitive fusion, as measured by the CFQ, and the fusion dimension in the MPFI. Furthermore, the score of CFQ is strongly correlated with that of MPFI-S-12 (Inaction) ($r = .64, p < .01$), indicating that higher cognitive fusion is associated with a tendency toward inaction.

The ELS, particularly its subscales of valued living and life fulfillment, is expected to show stronger correlations with MPFI-S-5 (Values) and MPFI-S-6 (Committed Action), as these MPFI factors are closely related to values-based living and committed actions that align with those values. The correlation between MPFI-S-5 (Values) and ELS-v1 (Valued Living) is notably stronger ($r = .51, p < .01$) than those of ELS-v1 with other MPFI-S factors. Similarly, the correlation between MPFI-S-6 (Committed Action) and ELS-lf (Life Fulfillment; $r = .46, p < .01$) is stronger than those of ELS-lf with other MPFI-S factors.

3.3. Interim Discussion for Study 2

The primary goals of Study 2 were to evaluate the factor structure, item performance, and validity evidence of a shortened version of the MPFI (i.e., MPFI-S) and examine its comparability to the original full-scale MPFI. These goals were achieved through a combination of CFA and IRT analyses and comparisons between the original (i.e., MPFI) and shortened (i.e., MPFI-S) forms, with a particular focus on psychometric properties and construct validity. Overall, the results of Study 2 preliminarily provide strong psychometric evidence for the MPFI-S's ability to maintain the integrity of the original MPFI, while offering advantages in terms of brevity.

Specifically, the results of factor structure in both Study 1 and Study 2 revealed that the scores of MPFI-S retain the same 12 first-order factors with two higher-order dimensions: psychological flexibility and psychological inflexibility. The model fit indices from CFA for the MPFI-S indicated a good fit, closely matching the original full version. The results also confirm that the observed variables in the MPFI-S were well aligned with their respective

latent constructs. Together with the findings of Study 1, the moderate negative correlation between the two higher-order latent factors found in Study 2 supports the conceptual distinction between flexibility and inflexibility within the MPFI-S. This replication of the original factor structure further confirms the structural validity of the MPFI-S, suggesting that the reduction in items did not compromise the dimensional structure of the original scale.

Additionally, the IRT analyses, particularly the use of GPCM, provided evidence for the functioning of the items in the MPFI-S. The findings showed that the item fits were generally acceptable, with the discrimination parameters being predominantly high to very high for most items. These high discrimination values suggest that the MPFI-S items are effective at differentiating individuals across a range of latent trait levels, which is a useful feature for ensuring precision in measurement (Baker & Kim, 2004; Hambleton & Swaminathan, 2013). Furthermore, the threshold parameter estimates indicated that the response categories functioned as expected, for example, with individuals exhibiting lower levels of psychological flexibility selecting lower response categories, and those with higher levels of flexibility selecting higher categories. The test information curves confirmed that the psychological flexibility and inflexibility factors achieved high precision within the latent trait range of -2 to 2, which is particularly useful for distinguishing individuals at both low and high levels of these constructs.

Furthermore, the comparison between the original 60-item MPFI and the 36-item MPFI-S demonstrated that both versions provided good model fit indices, with the shortened form slightly outperforming the original on fit indices, such as CFI and TLI. Once again, this set of findings suggests that the reduction in items did not detract from the overall goodness of fit and may have even contributed to being a more efficient psychometric model. The comparison of average factor scores revealed minimal differences between the two versions, with only slight variations observed in factors, such as Acceptance. These results further

support that the MPFI-S is functionally equivalent to the original version, with the reduction in items having a negligible impact on factor scores. Moreover, the small differences in bias index values between the two forms suggest that the MPFI-S provides an equivalent or perhaps slightly improved representation of the latent traits assessed by the MPFI.

Finally, it is worthwhile to discuss the validity evidence of MPFI-S in detail here. In sum, the validity of the MPFI-S was further supported by its correlational findings within the measure and between related constructs, which were conceptually coherent for both psychological flexibility and inflexibility in the Hexaflex model (Hayes, Strosahl, et al., 2012). More specifically, the first-order factors within each of the second-order factors of psychological flexibility and inflexibility generally showed strong consistency, indicating that these constructs are cohesive and related within their respective clusters. Additionally, the correlations between the first-order factors of the two clusters were small to moderate, suggesting that while psychological flexibility and inflexibility are related to each other, they are in fact distinct constructs (Doorley et al., 2020; Rolffs et al., 2018). It is also important to note that Study 2 found theory-inconsistent correlational findings related to Experiential Avoidance. Specifically, there were small, but significantly positive correlations between Experiential Avoidance (as measured by the MPFI-S-7) and three of the psychological flexibility factors (e.g., Self-as-Context, Values, and Committed Action). Additionally, Study 2 revealed no significant relationships between Experiential Avoidance and the scores of the PPFi or Psy-Flex. These findings suggest that Experiential Avoidance may not function in the way the Hexaflex model outlines at least for the present racially diverse sample. As discussed in depth below, this somewhat surprising finding warrants further exploration and consideration in future research.

Furthermore, worth noting is the large positive correlations found between the psychological flexibility factors (first-order factors) in the MPFI-S and the scores of PPFi and

Psy-Flex. More specifically, these findings demonstrate that in the domain of psychological flexibility, the MPFI-S maintains its conceptual alignment with other established measures of psychological flexibility.

With respect to relationships with distress variables, neuroticism, and negative affect (i.e. the DASS, BFI-neu, and PANAS-ne), the MPFI-S factors showed expected degrees of patterns, with the flexibility factors generally demonstrating moderate negative correlations with distress measures, while the inflexibility factors show moderate positive correlations. These findings suggest the divergent validity of the MPFI-S, confirming that the MPFI-S is likely to capture a construct(s) distinct from psychological distress, neuroticism, and negative affect in general.

Notably, as discussed above, divergent validity of psychological flexibility and inflexibility measures in the MPFI relative to distress, neuroticism, and negative affect is important because it ensures that a measure accurately captures the specific construct it is intended to assess, and not something else (Ong et al., 2020). Specifically, the favorable divergent validity of the MPFI-S is important in light of prior criticisms of other measures of psychological flexibility and inflexibility, such as the AAQ-II. As an example, extant literature has criticized the AAQ-II for its poor divergent validity and alignment between definition and measure (Cherry et al., 2021; Wolgast, 2014). That is, the AAQ-II was found to be more strongly associated with psychological distress, negative emotions, and neuroticism than with key facets of psychological flexibility or inflexibility, such as experiential avoidance (Cherry et al., 2021; Wolgast, 2014). This raises concerns about whether the AAQ-II in fact measures psychological inflexibility as intended or simply captures psychological distress as an outcome (Arch et al., 2022). In contrast to the findings in other measures of psychological flexibility and inflexibility, the MPFI-S appears to address these concerns by demonstrating that flexibility and inflexibility factors measured by the

MPFI-S are related, but distinct from distress, negative emotions, or neuroticism (Bond et al., 2011; Rochefort et al., 2018; Wolgast, 2014).

Relatedly, the results of Study 2 seem to adequately address the need for clear operational definitions and measurement distinctions in psychological flexibility and inflexibility research, the issue that have been raised urgently in the psychological science community (Arch et al., 2022; Cherry et al., 2021; O'Donohue, 2023). More specifically, the findings of Study 2 expand the extant literature on the construct validity of MPFI by examining the patterns of correlational results between scores of MPFI-S first-order factors with the scores of of CFQ, ELS, and QUEST, supporting the validity of MPFI-S at a first-order factor level (Hayes et al., 2011). For example, the CFQ, which measures cognitive fusion, demonstrated stronger correlation with the MPFI-S-10 (Fusion; $r = .71$), compared to the other MPFI-S factors (i.e., $.14 < |r| < .64$). Similarly, the correlation between the score of CFQ and that of MPFI-S-3 (defusion) was $-.43$, which was greater in absolute value than those of CFQ with other MPFI-S factors in the domain of psychological flexibility (i.e., $.13 < |r| < .28$). Study 2 revealed similar patterns in the centered domains of the Hexaflex model (e.g., associations of QUEST scores with and MPFI-S first-order factor scores) as well as in the engaged domains of the Hexaflex model (e.g., associations of ELS subscale scores and MPFI-S scores). Once again, these results further bolster the theoretical foundations of ACT and the effectiveness of the MPFI-S as a valid measurement tool at the first-order factor level.

In conclusion, the findings of Study 2 with the present Hawai'i-based sample of racially diverse college students provide strong support for the psychometric properties of the 36-item shortened version of MPFI (MPFI-S). The factor structure, item performance, and validity evidence suggest that the shortened version is comparable to the original. While there is no clear evidence that the shortened version outperforms the original, it is at least as

effective, offering a more concise and efficient tool without sacrificing the integrity of the original scale.

4. General Discussion

With Hawai‘i-based samples of racially diverse college undergraduates, the current dissertation project examined and validated the original MPFI and developed a new shortened-version of measure (MPFI-S), employing analyses based on CTT and IRT (DeMars, 2018). As discussed above, the concepts of psychological flexibility and psychological inflexibility are developed in the context of CBS and ACT (Hayes & King, 2024; Levin et al., 2014). As interest in CBS, ACT, and the psychological flexibility model has continued to grow in recent years (Ciarrochi et al., 2024; Hayes & Hofmann, 2017; Hofmann & Hayes, 2019), the importance of MPFI is increasingly recognized as a psychometrically sound tool for assessing psychological flexibility and inflexibility (Barrado-Moreno et al., 2025; Cherry et al., 2021). Within my dissertation project, Study 1 examined the psychometric properties of the original 60-item MPFI with the present racially diverse sample in Hawai‘i and selected three items from each first-order factor to create a 36-item MPFI-S. Study 2 further validated the psychometric properties of the MPFI-S using an independent sample of racially diverse college students in Hawai‘i. This general discussion section addresses four key topics on the MPFI and MPFI-S: (a) factorial structure, (b) item functioning, (c) construct validity, and (d) racial diversity. Within the latter two topics, I discuss some notable conceptual implications and external validity of the present findings.

4.1. Factorial Structure

As predicted, the present dissertation study with Hawai‘i-based samples replicated and confirmed the two higher-order factor model for both the original (i.e., MPFI) and shortened (i.e., MPFI-S) versions, in which each second-order factor has six subfactors (first-order factors). Since the development of the original MPFI (Rolffs et al., 2018), this factor

structure has been consistently supported across different samples and contexts (Rogge & Lin, 2024). For instance, the original 60-item MPFI has demonstrated this factor structure in diverse samples across the globe, including those from the United States (Seidler et al., 2020), Italy (Landi, Pakenham, Giovannetti, et al., 2021), Sweden (Sundström et al., 2023), Argentina (Simkin et al., 2023), and East Asian countries, such as China, Japan, and Taiwan (Lin et al., 2020). Similarly, the 24-item version of MPFI has also been investigated in various studies, which support the two higher-order factor structure (Fang et al., 2024; Gregoire et al., 2020; Seidler et al., 2020; Simkin et al., 2023). With some minor exceptions (Tabrizi et al., 2023; Thomas et al., 2021), the overall consistency of the two higher-order factor model across multiple samples in above-mentioned studies suggests its robustness (Nosek et al., 2022) across a wide range of populations, languages, and sociocultural contexts.

Given that the psychometric properties of a measure are sample-dependent and, potentially influenced by the characteristics of the sample under investigation (Haynes et al., 2018), the findings of the present Hawai'i-based racially diverse samples recruited for my dissertation project provide an additive perspective on the MPFI. More specifically, while some of the previous studies, such as Seidler et al. (2020), also recruited a sample of undergraduate psychology students (e.g., $M_{age} = 19.13$, $SD = 2.01$) comprising racially diverse individuals (e.g., White 56.7%, Black/African American 23.9%, Latino/a 9.2%), their sample lacked representation from other key racial groups in the U.S., including multiracial and Asian American groups. As previously noted, the multiracial and Asian populations are two of the fastest growing racial groups in the U.S. (U.S. Census Bureau, 2021), and in the present dissertation project, they composed of approximately 55% of my samples across Studies 1 and 2. Taking this into account, the replication of the two higher-order factor model of the MPFI within the current Hawai'i-based samples extends the model's generalizability in

factor structure to *this* racially diverse group. Furthermore, my dissertation project has made small and yet important contributions to the cross-cultural factorial validation efforts on the MPFI, extending its empirical and conceptual scope in factor structure to the present understudied groups of racially diverse individuals in Hawai‘i.

Furthermore, the current dissertation project shows that, within the present Hawai‘i-based samples, the original version of the MPFI has equivalent *factor structures*, *factor loadings*, and *intercepts* across two gender (i.e., women and men) and three racial groups specified, based on the sample size, in Study 1. With respect to gender, the measurement equivalence that was found across the two gender groups in Study 1 aligns with the extant literature. That is, some previous psychometric studies have supported measurement equivalence of the scores of MPFI across genders in various regional and cultural contexts, including France (Gregoire et al., 2020), Italy (Landi, Pakenham, Giovannetti, et al., 2021), and Sweden (Tabrizi et al., 2023). Similarly, the invariant findings across racial categories (i.e., Asian, White, and All Other) found in Study 1 are in line with a previous research that reported cross-cultural measurement invariance of MPFI among three Asian groups using their languages (i.e., traditional Mandarin for participants from Taiwan, simplified Mandarin for those from China, and Japanese for those from Japan) (Lin et al., 2020). Together, a major implication of this domain of findings (i.e., measurement invariance) is that any observed differences in scores across gender and racial groups in the way that were specified based on sample size and distribution can be attributed to true differences in psychological flexibility or inflexibility, rather than to measurement bias or differing interpretations of the scale (Borsboom, 2006).

With respect to the implication of measurement invariance findings, worth highlighting is that the gender and racial group categorization used in the current dissertation project was *methodologically* driven, based on the sample characteristics and the size of

participants across racial/ethnic categories (e.g., Black = 10, Latinx = 54, Native Hawaiian = 20), but not conceptually driven. In other words, the resultant breakdown of participants into two gender and three racial categories (i.e., women, men; Asian, White, and All Other groups) was done mainly to ensure sufficient statistical power for measurement invariance testing. Although this grouping method is consistent with a prior psychometric validation study with a racially diverse college sample in Hawai‘i (Spencer et al., 2022), it can be extremely problematic for examining conceptual implications and external validity of the present findings. For example, it is possible that the present *equivalent* findings may not accurately reflect the factor structure of MPFI in specific racial/ethnic subgroups (e.g., Native Hawaiians) that were methodologically and yet somewhat arbitrarily aggregated into one of the three methodologically determined racial categories (e.g., All Other). Additionally, this methodology-based grouping in race/ethnicity seem to obscure the insight into the generalizability of the present findings (Haynes et al., 2018). For example, unclear is the extent to which the present findings on measurement invariance in race/ethnicity are generalized to other racially diverse groups in the U.S., such as ones in Atlanta, Georgia. The concerns and limitations related to the external validity of my dissertation findings will be discussed more extensively below in 4.4. Racial Diversity.

4.2. Item Functioning

As mentioned earlier, IRT is not frequently utilized in psychometric validation studies, despite its advantages in evaluating the performance of individual items (Reise & Waller, 2009). In fact, a literature review of the MPFI revealed that no validation studies incorporating IRT analysis have been published since the original scale development study (Rolffs et al., 2018). This empirical gap highlights the potential value of my dissertation project, which incorporated IRT into the validation process of the original MPFI with a

Hawai'i-based sample (i.e., Study 1) and the development and validation of the 36-item MPFI-S in Study 2.

Worth highlighting is that, informed by IRT, the present dissertation project prioritized the item discrimination parameter when selecting well-functioning items for the MPFI-S (Baker & Kim, 2004). Specifically, items with a high or very high level of discrimination were considered as performing well (Baker & Kim, 2004). In Study 1, all items, except for MPFI 1, showed good functioning. In Study 2, which used the selected items from Study 1, all items demonstrated good functioning. During the original development of the MPFI (Rolffs et al., 2018), IRT analysis was performed to select the best-functioning items from a large item pool, so the results obtained from the present dissertation project were not entirely surprising. However, together with the replication of the original factor structure, the replication of the original IRT findings with the present Hawai'i-based samples is a small and yet important contribution of my present dissertation. This is because the original MPFI study was conducted with a predominantly White adult sample in the U.S. and the present Hawai'i-based samples seem vastly different in racial group composition from other racially diverse samples studied in previous MPFI studies (Fang et al., 2024; Landi, Pakenham, Crocetti, et al., 2021; Lin et al., 2020; Seidler et al., 2020; Simkin et al., 2023; Sundström et al., 2023). In other words, my dissertation project offers an additive insight into the extent of the generalizability of the original MPFI findings of MPFI at the item level functioning. Importantly, the test information curve for both the original MPFI and the MPFI-S in the present dissertation project showed that they effectively measured across theta levels from -2 to 2, covering most of the range, which replicates and further supports the findings of the original MPFI psychometric validation study (Rolffs et al., 2018).

Relatedly, it is also worthwhile to discuss further the development and validation processes/steps of the 36-item MPFI-S that I undertook in the present dissertation project, and

contrast them with those employed for the 24-item MPFI in the original MPFI validation study (Rolffs et al., 2018). In Rolffs et al., the 24-item MPFI was based on selecting two items with the highest *discrimination parameters* from each factor (first-order factor). As mentioned earlier, in the present dissertation project, these items also showed high discrimination parameters, but they were not necessarily the highest in the present Hawai‘i-based samples. In the present dissertation project, intentional efforts were made to create a more refined shortened version by employing various methods beyond discrimination properties. These various methods include other psychometric properties (e.g., factorial structure, measurement invariance, and item categories) along with conceptual considerations (e.g., alignment with definitions, divergent features from related constructs, and content overlap among MPFI items). As discussed above, the use of these various methods was necessary because most items performed well, making it challenging to distinguish between them based solely on discrimination criteria.

Interestingly, the use of various methods in examining item functioning confirms that the original MPFI is a well-constructed scale, but it also poses a challenge in selecting items for the shortened version. More specifically, in Study 1, through a thorough content review (Terwee et al., 2018), three items were selected *methodologically* for each first-order factor, and then these items were verified once again *methodologically* using an independent sample in Study 2. That being said, as discussed more extensively below, the MPFI-S benefits from additional examinations to select and revise its items and to explicate its psychometric properties further. With this in mind, regarding the item selection, future studies should employ a more systematic method of item selection, such as Delphi method (Terwee et al., 2018), which delineates a set of *evidence-based* and also *theory-informed* process for item selection. More specifically, as discussed and outlined in depth elsewhere (Terwee et al., 2018), the Delphi method involves systematic input from a panel of experts through multiple

rounds of feedback, with the goal of reaching consensus on the most relevant and representative items based on predetermined empirical and theory-informed criteria. Integrating such a method may enhance the empirically-based and theory-informed consensus of the item selection, supporting the shortened version of the MPFI to capture the scope, depth, and precision of psychological flexibility and inflexibility in theory and practice (Biglan & Hayes, 1996).

Furthermore, with respect to item functioning, the present dissertation project confirms that the 6-point scale used in the original MPFI functions effectively for the present Hawai‘i-based samples in both MPFI and MPFI-S. The main feature of the 6-point scale is that it does not have a midpoint. Chyung et al. (2017) stated that a midpoint can be useful when respondents are familiar with the topic and should be allowed to express a neutral opinion. However, if respondents are not expected to have formed an opinion on the topic, it is recommended to omit the midpoint to avoid potential misuse (Chyung et al., 2017). Once again, in the present dissertation project, both Study 1 and Study 2 confirmed that the 6-point scale functioned well for the MPFI and MPFI-S to capture the constructs of psychological flexibility and psychological inflexibility at first-order factor and higher-order factor levels.

4.3. Construct Validity of MPFI and MPFI-S Scores

With Hawai‘i-based samples of racially diverse college students, the results from Study 1 and Study 2 generally provide conceptually aligned evidence for the convergent and divergent validity of the 60-item MPFI and 36-item MPFI-S. In this section, theoretical implications of these validity-related findings are summarized as four major takeaways. These four major takeaways are on (a) construct validity of MPFIs within the Hexaflex model, (b) divergent validity of MPFIs in relation to distress variables, negative affect, and neuroticism, (c) construct validity of MPFIs at the first-order and higher-order level, and (d) unexpected findings on experiential avoidance.

4.3.1. Construct Validity within the Hexaflex Model

First, the evidence of convergent and divergent validity found in my dissertation project suggests that the two sets of factors, presumably psychological flexibility and psychological inflexibility, measured by the MPFI and MPFI-S are related, and yet qualitatively distinct from each other. More specifically, consistent with more recent literature (Cherry et al., 2021; Rolffs et al., 2018; Stabbe et al., 2019), the correlational results of the 60-item MPFI in Study 1 generally demonstrated moderate to large intra-cluster correlations and small inter-cluster correlations among psychological flexibility and inflexibility factors. Additionally, with the MPFI-S, Study 2 generally replicated these inter- and intra-factor correlational findings of Study 1, further supporting the empirical distinction between psychological flexibility and psychological inflexibility, measured by the MPFI (Cherry et al., 2021; Rolffs et al., 2018; Stabbe et al., 2019).

4.3.2. Divergent Validity

Second, the present dissertation project shows that the two sets of factors, presumably psychological flexibility and psychological inflexibility, measured by the MPFI and MPFI-S, are likely to be qualitatively distinct from the constructs of psychological distress, negative affect, and neuroticism. As discussed extensively above, this set of validation efforts was particularly important mainly because some of the extant measures of psychological flexibility and inflexibility, such as the AAQ-II, have faced criticism regarding their questionable divergent validity in light of psychological distress, negative affect, and neuroticism (Tyndall et al., 2019). Specifically, as discussed extensively elsewhere (Arch et al., 2022; Bond et al., 2011; Rochefort et al., 2018; Wolgast, 2014), scores of these extant measures have been criticized to be more strongly associated with the scores of these internalizing issues than those of psychological flexibility/inflexibility and their facets, such as experiential avoidance.

Study 1 of my dissertation project showed that both psychological flexibility and psychological inflexibility, purported constructs measured by the MPFI, were associated with psychological distress variables in a theoretically consistent manner with the degrees of associations suggesting that they were nonetheless qualitatively distinct from these distress variables. More specifically, the strengths of these correlations (i.e., $|rs|$) remained below .7, indicating that these factors are not likely to reflect the same construct. Furthermore, results of Study 2 suggest that psychological flexibility and psychological inflexibility measured by the 36-item MPFI-S are also likely to be qualitatively distinct from the constructs of negative affect (i.e., PANAS-Negative) or neuroticism (i.e., BFI-Neuroticism). Nevertheless, worth noting is that the strengths of associations of psychological flexibility and psychological inflexibility measured by the MPFI and MPFI-S with distress variables, negative affect, and neuroticism (i.e., $.23 < |rs| < .67$) overlapped or were seemingly comparable to those with the scores of others psychological flexibility measures (e.g., PPFi, Psy-Flex; $.29 < |rs| < .64$). In other words, if the criterion of $|r| < .7$ is applied, these findings suggest that the higher-order factors, presumably psychological flexibility and psychological inflexibility, measured by the MPFI and MPFI-S are related to, and yet distinct from psychological flexibility measured by the PPFi and Psy-Flex. As such, as discussed in depth below, future studies should investigate the convergent and divergent validity of MPFI and MPFI-S scores further, especially those that represent the higher-order factors (i.e., psychological flexibility and psychological inflexibility) to elucidate whether they represent psychological flexibility and inflexibility in the way its guiding theory postulates and whether they are in fact qualitatively distinct from distress variables, negative affect, and neuroticism.

4.3.3. Construct Validity at the First-Order and Higher-Order Levels

Third, despite the above-mentioned concern (i.e., the MPFIs, PPFi, and Psy-Flex potentially measuring distinct constructs), results of Study 1 and Study 2 with the Hawai'i-

based samples suggests that generally the scores of MPFI and MPFI-S are in fact likely to capture psychological flexibility and psychological inflexibility both at the first-order factor and higher-order factor levels. More specifically, in Study 1, when the scores of the MPFI were compared with those of other measures of psychological flexibility (i.e., scores of PPF and PsyFlex), the strengths of associations were generally moderate to strong (i.e., $.37 < |rs| < .55$). With the inclusion of additional measures of specific facets of psychological flexibility/inflexibility (e.g., self as context, cognitive fusion, value, and committed action), results of Study 2 further offered the evidence of convergent and divergent validity of MPFI-S particularly at the first-order factor level. For instance, the MPFI-S factor of Self-as-Context (i.e., MPFI-S-3) was strongly correlated with the composite score of QUEST, measures of self-transcendence ($r = .55$), more so than other first-order factors in psychological flexibility ($.38 \leq rs \leq .45$). Similarly, the MPFI-S factors related to Values and Committed Action (i.e., MPFI-S-5 and MPFI-S-6, respectively) demonstrated strong correlations with the composite score of ELS, a measure of values-based living ($.53 \leq rs \leq .54$) more so than the remaining first-order factors in psychological flexibility ($.29 \leq rs \leq .41$), and the MPFI-S factor for Fusion (i.e., MPFI-S-10) showed a particularly strong relationship with the score of CFQ, a measure of cognitive fusion ($r = .71$). In sum, this set of validity evidence of MPFI-S at the first-order factor level generally provides further evidence of its robustness in capturing aspects of psychological flexibility and inflexibility.

4.3.4. Experiential Avoidance

Fourth and finally, the last takeaway is that the present correlational results also show some *theory-inconsistent* anomalies regarding Experiential Avoidance (MPFI-7 and MPFI-S-7 for the original MPFI and MPFI-S, respectively). As discussed above, throughout Studies 1 and 2, the factorial validity and item-level functioning of what is termed “experiential avoidance” (MPFI-7 and MPFI-S-7) were supported. This suggests that both the five items in

the original MPFI and the three items in the MPFI-S reliably measure the same construct of presumably experiential avoidance. However, when correlational results of MPFI-7 and MPFI-S-7 were carefully reviewed, a series of unexpected findings emerged.

4.3.4.1. Relations of Experiential Avoidance with Other First-Order Factors

First, in Study 1, experiential avoidance, the score of MPFI-7, did not show statistically significant associations with several psychological flexibility factors (i.e., Present Awareness, Self-as-Context, Values, Committed Action; $.04 \leq |r| \leq .06$), and its correlations with Acceptance (i.e., MPFI-1) and Defusion (i.e., MPFI-4) were significant and negative as predicted, but small ($-.11 \leq r \leq -.09$). Moreover, in Study 2, there were small, but significantly *positive* associations of experiential avoidance (i.e., MPFI-S-7) with three of the psychological flexibility factors (i.e., Self-as-Context, Values, Committed Action), and no significant relationships were observed with the scores of PPF1 or that of Psy-Flex. Together, this set of findings suggest that experiential avoidance may not be relevant to psychological flexibility in a conceptually meaningful way, at least in the present Hawai'i-based samples.

Once again, this conceptual implication drawn from these findings was unexpected because, in theory, experiential avoidance is often conceptualized as the most defining feature of psychological inflexibility (Hayes et al., 2006; Hayes et al., 1996), which is in the direct opposite of psychological flexibility (Hayes, Barnes-Holmes, et al., 2012; Hayes et al., 2007). Furthermore, in practice, interventions that target facets of psychological flexibility, such as self-as-context and values aim to reduce the dominance of experiential avoidance in a client's overall behavioral repertoire (Hayes, Barnes-Holmes, et al., 2012; Hayes et al., 2007). As such, this absence of expected negative correlations raises questions about whether the MPFI and MPFI-S operationalize experiential avoidance in a way that aligns with *experiential avoidance* as conceptualized through the functional contextualist framework and Hexaflex Model within CBS (Biglan & Hayes, 1996; Hayes, Strosahl, et al., 2012).

Second, the present dissertation project shows that, in both Study 1 and Study 2, the positive associations of experiential avoidance with other first-order facets of psychological inflexibility were statistically significant, but small (i.e., $.11 \leq r \leq .29$), while other first-order factors in psychological inflexibility were positively associated with one another more strongly (i.e., $.39 \leq r \leq .76$). Once again, this set of findings is surprising in part because they suggest that, although experiential avoidance measured by the MPFIs is indeed related to other first-order aspects of psychological inflexibility within the MPFIs, it may function somewhat distinctly from the rest of first-order psychological inflexibility facets (Baker & Berghoff, 2022), or that the function of experiential avoidance measured by the MPFIs is a more nuanced or context-dependent in such a way that it may not always serve as part of the overall inflexible repertoire (Hofmann & Hay, 2018). More importantly, this set of findings seems to point to the urgent need for investigating the construct validity of MPFI-7 and MPFI-S-7 (i.e., what they really measure), which will be discussed further in the following.

4.3.4.2. Speculations on What the MPFI-7 and MPFI-S-7 Actually Measure

Relatedly, third, correlational findings may offer some insights into what the MPFI-7 and MPFI-S-7 actually measure in light of other constructs measured in the present dissertation project. For example, results show that other first-order factors of psychological inflexibility measured by the MPFI and MPFI-S were more strongly associated with the score of PPFi-Avoidance, a measure of experiential avoidance in the PPFi, in a theoretically consistent way (i.e., $.33 \leq |r| \leq .54$ in Study 1; $.29 \leq |r| \leq .49$ in Study 2) than with the score of MPFI-7 (i.e., $|r| = .21$) and that of MPFI-S-7 (i.e., $|r| = .05$).

Although largely speculative, there are several conceptual implications emerged from these findings. First, these findings may suggest that the PPFi-Avoidance scale may capture aspects of experiential avoidance that are more closely aligned with the broader construct of psychological inflexibility theorized by the MPFI and MPFI-S, as opposed to the MPFI-7 and

MPFI-S-7. If this is the case, the items included in MPFI-7 and MPFI-S-7 need to be carefully reviewed and then revised, if necessary. Second, related to the first speculation, it is possible that experiential avoidance measured by the MPFI and MPFI-S are qualitatively distinct from experiential avoidance measured by the PPFi. That is, as the developers of PPFi argued (Kashdan et al., 2020), consistent with the CBS's emphasis on the functional dimensions of psychological flexibility/inflexibility, the PPFi-Avoidance scale likely captures experiential avoidance as a contextually embedded maladaptive process in ways that it prevents individuals from engaging in values-directed behaviors, perhaps more so than the MPFI-7 and MPFI-S-7 did with the present Hawai'i-based samples. In other words, at least within the present Hawai'i-based samples, by framing experiential avoidance in relation to goal-directed behavior (e.g., "I avoid the most difficult goal-related task," "when I feel stressed pursuing this goal, I give up"), the PPFi likely taps into functional and maladaptive dimension of experiential avoidance. Once again, this conceptual account aligns closely with CBS's functional and contextual accounts of psychological flexibility/inflexibility (e.g., Hexaflex Model) that the MPFI presumably follows closely. On the other hand, experiential avoidance subscales of MPFI and MPFI-S seems to assess experiential avoidance as a context-free topographically identified trait (e.g., act of avoiding negative emotions; "I tried to distract myself when I felt unpleasant emotions."), which, in the present Hawai'i-based samples, might not have adequately captured the maladaptive functional qualities of experiential avoidance as outlined by the CBS theories (Hayes & Brownstein, 1986; Vilardaga et al., 2009).

4.3.4.3. Experiential Avoidance and the Present Hawai'i-based Samples

The unexpected findings of experiential avoidance in Study 1 and Study 2 need to be interpreted with caution in light of extant findings of MPFI (Rolffs et al., 2018; Thomas et al., 2021). As discussed above, within the present Hawai'i-based samples, the intra-cluster

correlations of experiential avoidance (MPFI-7 and MPFI-S-7 for Study 1 and Study 2, respectively) were significant, but substantially smaller relative to other intra-cluster correlations found in the domain of psychological inflexibility. However, importantly, in previous validation studies of MPFI with U.S. samples (Rolffs et al., 2018; Thomas et al., 2021), the intra-cluster correlations of experiential avoidance were between medium and large, undistinguishable to other intra-cluster correlations in psychological inflexibility. In other words, the present unexpected findings may be relatively unique to the present Hawai‘i-based samples perhaps due to the *sociocultural contexts* of the present Hawai‘i-based samples that qualitatively differ from those of study participants in previous MPFI studies (Rolffs et al., 2018; Thomas et al., 2021).

I have this speculation in part because experiential avoidance measured by the MPFIs in the present dissertation project appears to be *qualitatively distinct* from experiential avoidance measured by the MPFI in the previous MPFI studies. More specifically, unlike these previous studies show, in the present Hawai‘i-based samples, experiential avoidance measured by the MPFIs was less relevant to the overall repertoire of psychological flexibility measured by the MPFIs and the associations of experiential avoidance (i.e., MPFI-7 and MPFI-S-7) with psychological distress, negative affect, and neuroticism were generally *significant, but small* (i.e., $.07 \leq rs \leq .15$). The latter part of these findings is particularly salient because, in the present dissertation project the associations of other psychological inflexibility facets (first-order factors) measured by the MPFIs with these variables were all significant and at least medium in effect size. Once again, in research, experiential avoidance is consistently found to be positively associated with a range of distress variables with medium-to-large effect sizes (Gámez et al., 2014a, 2014b; Gámez et al., 2011), and this was generally the case in previous MPFI validation studies (Rolffs et al., 2018; Thomas et al., 2021). Conceptually, a medium or large effect size of positive associations between

experiential avoidance and distress variables is also expected because persistent efforts to control or avoid these negative internalizing states (i.e., experiential avoidance) are known to be themselves distressful (Hayes et al., 1996; Kashdan et al., 2006). Making sense of these findings on experiential avoidance through this CBS-informed conceptual lens, a possible conceptual implication is that experiential avoidance measured by the MPFI and MPFI-S in the present Hawai‘i-based samples, may not necessarily reflect the *persistent, chronic, and unworkable features* of experiential avoidance that are themselves distressful. As previously mentioned, the focus on the topographical features of avoidance in the MPFI and MPFI-S (e.g., frequency of suppressing emotions irrelevant of contexts) may fail to capture this defining functional nature of experiential avoidance outlined in the CBS models (e.g., Hexaflex model).

Taking all these above-mentioned implications into consideration, it is then possible to speculate several reasons for these unexpected findings of experiential avoidance (i.e., experiential avoidance is neutral to distress) in the present Hawai‘i-based samples. First, research has shown that the act of experiential avoidance can be less harmful in certain contexts particularly in *the short-term* (Yoon et al., 2024). For example, experiential avoidance is known to serve as an adaptive coping strategy during extremely challenging times, such as bereavement, at least in a short-term (Shear, 2010). From this perspective, as speculated above, it may be that the present Hawai‘i-based samples might have used experiential avoidance strategies occasionally in a short-term fashion, rather than as chronic and often unworkable coping strategies. Second, similarly, research shows that experiential avoidance often occurs as a step toward values-directed actions (e.g., connecting with loved ones), a major feature of psychological flexibility. In this case, avoidance serves as an effective coping strategy more so than as a maladaptive coping (Hofmann & Hay, 2018). From this account, the present findings may suggest that among the present Hawai‘i-based

samples, experiential avoidance might have been engaged in a less maladaptive way and sometime in a *goal-directed* way. From a larger meta-theoretical perspective, this dynamic nature of experiential avoidance highlights why ACT emphasizes the importance of paying attention to the *function* of behavior rather than its *form* (Hayes & Wilson, 1994).

Given this, worth noting is that in some part of the globe, such as East Asian cultures, avoiding the experience of difficult internal events, especially those that may lead to interpersonal conflicts, is often viewed as more *socially and personally acceptable*, therefore perhaps adaptive in these cultural contexts, than in Western cultural contexts (Masuda, 2020; Masuda & Qina‘au, 2022; Yoon et al., 2024). Particularly relevant to the present dissertation project, this cross-cultural awareness may offer an insight into how the act of experiential avoidance is practiced in the cultural context of Hawai‘i. More specifically, research shows that East Asians tend to report greater experiential avoidance compared to Westerners, but interestingly it also shows that the correlation between experiential avoidance and distress is smaller among East Asian students, compared to White American students (Drake et al., 2019; Lin et al., 2020; Yoon et al., 2024). Although Hawai‘i is part of the U.S., presumably part of Western culture, its cultural practice and sociocultural contexts are known to resemble those of East Asian cultures (Maretzki, 2011). As such, it is possible that the majority of the present Hawai‘i-based sample, regardless of their racial background, have been exposed to these regional cultures where experiential avoidance is practiced as a less rigid coping/regulation strategy for difficult personal experiences or negative affect. From this perspective, the present findings of experiential avoidance do not seem to be surprising.

Second, in the context of validating English and French version of MPFI short form (i.e., 24-item versions), Gregoire et al. (2020) raised the concern that the Experiential Avoidance factor of the MPFI (MPFI-7) might not consistently reflect the intended meaning of experiential avoidance among some groups of individuals, and that the factor measured by

the MPFI-7 could be confounded with the concepts of other coping strategies, including acceptance. This perspective is relevant to the adaptive nature of experiential avoidance, at least on an occasional basis, discussed above. In fact, careful inspection of items in the MPFI-7 or MPFI-S-7 suggests that some of these items (e.g., “I tried to distract myself when I felt unpleasant emotions,” “When unpleasant memories came to me, I tried to put them out of my mind.”) may be confounded with aspects of a *longer-term/overall* process of *acceptance* for some individuals because they describe strategies that could serve different functions depending on context. For example, individuals might briefly distract themselves from anxiety during a work meeting to stay present and later process the emotion in a healthier way. This aligns with the process of acceptance because the goal is not to eliminate a given form of emotion permanently, but simply to put them aside, so that it does not interfere with their value-informed behavior. Thus, from this perspective, distraction or thought suppression could reflect maladaptive (e.g., if used inflexibly to escape discomfort at the expense of valued action) or adaptive (e.g., if used flexibly to manage distress while still engaging in meaningful behavior) emotion regulations, depending on the contexts (Hofmann & Hay, 2018). Relevant to the present dissertation projects, it may also be that the present Hawai‘i-based samples engages in experiential avoidance at least occasionally as part of broader goal-directed and acceptance-like coping and regulation styles (Weisz et al., 1984; Yoon et al., 2024). Once again, this account may help explain positive associations between Experiential Avoidance and some of the first-order factors of psychological flexibility (i.e., Self-as-Context, Values, and Committed Action) found in Study 2.

Third, literature of cross-cultural psychology explicitly states that in some sociocultural context, act of experiential avoidance is not only culturally accepted, but it is also psychologically adaptive (Weisz et al., 1984). Worth noting as well here is that the original conceptualization of experiential avoidance (i.e., Hayes et al., 1996) was informed by

clinical observations in *Western cultural contexts*. From this cross-cultural perspective, the Western perspective of experiential avoidance implicitly reflect what is called primary control strategies (Weisz et al., 1984), where psychological health is often attempted to be achieved by directly attempting to alter or control internal experiences (e.g., reducing anxiety, suppressing traumatic memories), despite their longer-term iatrogenic consequences (experiential avoidance). Such an approach aligns with the independent self-construal (Markus & Kitayama, 2010), which emphasizes autonomy, self-regulation, and the individual's ability to change their environment or internal states.

However, this Westernized framing may overlook culturally adaptive forms of coping practiced elsewhere, such as secondary control strategies that emphasize salutary process of acceptance, adjustment, and harmony with one's circumstances (Weisz et al., 1984). According to this cross-cultural conceptual framework, the act of experiential avoidance can be psychologically adaptive or at least neutral in some sociocultural context as it includes these above-mentioned salutary processes. For example, in cultures where interdependent self-construal prevails (Markus & Kitayama, 2010), what appears as experiential avoidance may instead represents an adaptive strategy for maintaining social harmony. While the distinction between independent and interdependent self-construals may be less clear in today's society (Suh et al., 2024), where traditional cultural or regional boundaries no longer fully apply, from this point of view, the present findings may support this cross-cultural argument that the Westernized concept of experiential avoidance may be less applicable to individuals in less Westernized cultural contexts, presumably such as ones in Hawai'i.

Finally, this set of speculation on the present findings of experiential avoidance may have broader implications for understanding the role of cultural contexts in shaping the processes of psychological flexibility and inflexibility (Masuda, 2020). More specifically, a major takeaway may be that experiential avoidance is not a uniformly negative or

maladaptive phenomenon across the globe, and the present dissertation project offers preliminary findings supporting this claim through the investigation of MPFI and MPFI-S with Hawai‘i-based samples. Today, still limited, supporting evidence of this claim has emerged in the field of CBS. For example, Parker et al. (2024) reported that, in a given sociocultural context, while experiential avoidance showed expected associations with inflexibility processes and negative mental health outcomes (e.g., cognitive fusion, self-as-content, inaction, and somatic anxiety), it also showed unexpected weak positive associations to flexibility processes (e.g., self-as-context and values). Interestingly, the network analysis results from this study also suggest that experiential avoidance is more likely a consequence of other psychological inflexibility processes (e.g., cognitive fusion, self-as-content), rather than a primary driver (Parker et al., 2024). Relevant to the present findings, Parker et al. (2024) propose that in specific contexts, such as when avoiding distress temporarily to pursue meaningful goals, small amounts of experiential avoidance resultantly might create adaptive psychological distance, enhancing perspective-taking or values-driven behavior. In sum, the adaptive or maladaptive qualities of experiential avoidance may depend on the idiographic cultural and an individual’s broader psychological and social environment and how it is practiced (Waugh et al., 2020). From this perspective, it is absolutely critical to identify and measure the *contexts* of experiential avoidance when researchers are interested in the functional nature/essence of experiential avoidance (Biglan & Hayes, 1996; Hayes & Wilson, 1994).

4.4. Racial Diversity

Finally, prior to discussing the practical implication of the present dissertation project, I would like to discuss the external validity of present findings in light of “racial diversity” in the field of psychological science. As previously discussed, when the two versions of MPFI were analyzed separately with two Hawai‘i-based samples of racially diverse college students

in the present dissertation project, they generally showed strong psychometric qualities across structural dimensions, item-level functioning, and relationships with other constructs. These findings are especially encouraging given the current trend of racial diversity in the U.S. More specifically, as the U.S. society is increasingly becoming a multi-racial and multi-cultural society (U.S. Census Bureau, 2021), there is a growing need to develop and disseminate psychometrically sound measures of key psychological constructs for diverse groups of individuals (Haynes et al., 2018).

The term “diverse” in the context of current dissertation project reflects the multiethnic composition of the Hawai‘i-based sample (primarily Asian, White, and Multiracial individuals), which captures variability in cultural backgrounds and identities. However, consistent with critiques of broad racial categorizations (Haynes et al., 2018; Lu, 2024), I acknowledge that labeling a sample as “diverse” does not necessarily imply exhaustive representation of all racial and cultural dimensions (e.g., specific racial subgroups) in the U.S. and across the globe. In other words, the term “diversity” within my dissertation manuscript refers to the presence of multiple racial/ethnic groups, and I recognize limitations in the generalizability of my dissertation findings to other racially diverse and/or specific racially underrepresented populations (e.g., monoracial Black or Latinx communities). I also acknowledge that the racial categorization used for analyses in my dissertation project was methodology-informed, but not theoretically informed. As such, it is possible that present findings obscure the psychological flexibility and inflexibility of subgroups of individuals (e.g., Chinese American and Filipino American participants in Hawai‘i) aggregated into one of the three racial categories (e.g., “Asian”). In sum, the extent of the generalizability of the present findings to other groups is bounded by the match between cultural and demographic characteristics of the current Hawai‘i-based sample (primarily Asian, White, and Multiracial groups) and those of these target groups. Thus, it is safe to caution that psychometric

evidence of the present study cannot be assumed, without direct investigation, to generalize across other “diverse” populations (O’Donohue et al., 2022).

4.5. Practical Implications

The current research has several practical implications. The validity evidence obtained from the present Hawai‘i-based racially diverse samples highlights the importance of using the 60-item and 36-item MPFIs for diverse groups of individuals in the U.S. *with cautions*. In other words, if possible, the psychometric qualities of these measures both at the first-order factor and higher-order factor levels should be investigated first with a target sample of interest so that the constructs are measured accurately and meaningfully within the cultural and contextual background of that group (Haynes et al., 2018; Haynes et al., 2019). This is because while the psychometric quality of MPFI found in the original validation study (Rolffs et al., 2018) are largely generalized to the present samples, the present dissertation project also shows the psychometric characteristics of the MPFI and MPFI-S are also sample-dependent. As such, researchers, clinicians, and practitioners can use the MPFI for diverse populations in a broader range of settings, but they should do so with caution without making universality assumptions drawn from the original validation study (Rolffs et al., 2018).

Furthermore, practically, the validation of the 36-item MPFI-S also holds significant implications for its use in applied settings. As noted above, the brief nature of the MPFI-S makes it more feasible for clinical assessments, particularly in situations where a quick yet relatively valid and reliable measure of psychological flexibility and inflexibility is needed to guide intervention strategies (Rammstedt & Beierlein, 2014; Smith et al., 2000; Widaman et al., 2011). By retaining the core items of psychological flexibility and inflexibility from the original MPFI, the MPFI-S remains to capture the essential components necessary for the assessment of clients using the psychological flexibility model, treatment planning, and progress monitoring, at least for populations that the present Hawai‘i-based samples are

purported to represent. Having said that, once again, given the findings of experiential avoidance measured by the MPFI-S, extra cautions are required when used.

4.6. Limitations and Future Directions

The present dissertation project has several notable limitations. First, philosophically and theoretically, psychological flexibility and psychological inflexibility measured by the self-report methods, such as MPFI and MPFI-S are not philosophically and conceptually aligned with psychological flexibility and psychological inflexibility theorized using the framework of functional contextualism (Hayes, Barnes-Holmes, et al., 2012; Newsome et al., 2019). As discussed above, using a framework of “act-in-context,” functional contextualism emphasizes the importance of understanding psychological flexibility and inflexibility within specific behavioral contexts (i.e., “act-in-context”), which is ideally achieved through behavioral observation and self-monitoring in real time, rather than problematic reliance on retrospective recall (Newsome et al., 2019; Vilardaga et al., 2009). This is because these behavioral methods take into account the functional and contextual aspects of individual behavioral repertoires, including the repertoire of psychological flexibility and psychological inflexibility (O'Donohue, 2023).

However, when psychological flexibility and psychological inflexibility are measured with a self-report instrument, they are implicitly conceptualized and measured more as psychological trait that are relatively stable and context-independent (Moore, 1998). Not measuring psychological flexibility and psychological inflexibility contextually and behaviorally is particularly concerning as there are only small associations found between self-report measures and behavioral measure (e.g., functional assessment; Biglan & Hayes, 1996; Boulanger et al., 2010; Hayes et al., 1996), suggesting that relying solely on self-report questionnaires may not capture these contextual and functional features of psychological flexibility or inflexibility that are emphasized in its guiding theory (Dang et al., 2020;

Vilardaga et al., 2009). As such, to address this conceptual and philosophical limitation, when investigating psychological flexibility/inflexibility, ideally, it is recommended to incorporate multiple measurement methods (e.g., functional analysis) to complement one another (Semmer et al., 2003).

Second, building on the previous point, some self-report measures of psychological flexibility have attempted to account for the contextual aspects of flexibility by including additional items designed to capture contextual factors (e.g., Personalized Psychological Flexibility Index; Kashdan et al., 2020). For example, the Personalized Psychological Flexibility Index (PPFI) is a context-specific self-report measure that asks participants to respond based on an important goal they are currently working on, and in the PPFI, it is this context of pursuing important goal where different facets of psychological flexibility and psychological inflexibility are assessed. The MPFI used in the present dissertation project lacks this contextual specificity. Relevant to the present findings, it is also possible to speculate that the lack of context-specificity in the MPFI and MPFI-S might explain some of the unexpected findings the present dissertation project found (e.g., experiential avoidance measured via MPFI and MPFI-S). As such, future psychometric investigations of MPFI and MPFI-S should consider incorporating context-sensitive elements to better capture how psychological flexibility and inflexibility processes manifest in specific, meaningful domains of one's lives. This may enhance the ecological and construct validity of the measures.

Third, the present Hawai'i-based study samples were predominantly female undergraduate students recruited from a single university in Hawai'i rather than a random sample from diverse racial and ethnic populations in Hawai'i or elsewhere. This limited demographic representation of the sample obscures the extent of generalizability of the present findings, particularly with respect to other racially diverse groups. Once again, as discussed extensively above, future studies should accumulate psychometric evidence of

MPFI and MPFI-S for specific groups of racially diverse individuals (e.g., Native Hawaiians in Hawai‘i), including clinical samples.

Fourth, as noted above, the present dissertation project might have failed to conduct a more comprehensive evaluation of content/construct validity of MPFI and MPFI-S. More specifically, given that psychometric analysis of the original 60-item MPFI suggests that most items perform well (e.g., discrimination parameters), content validity became especially important for selecting the most appropriate items for the MPFI-S, especially for the items of experiential avoidance factor. Furthermore, a well-established approach for achieving expert consensus on the relevance and comprehensiveness of content (i.e., Delphi method) were not used in the present dissertation project (Terwee et al., 2018). The absence of thorough investigation in content validity may have limited the depth of the validation efforts.

It is also important to note that the items for MPFI-S were selected from a well-validated scale of psychological flexibility and inflexibility. Given that the MPFI is already a theory-informed measure of psychological flexibility and inflexibility, the psychometrically guided selection process might still operate within a theoretically coherent framework. Nevertheless, future research may benefit from employing the Delphi method to further strengthen content/construct validity of MPFI and MPFI-S, for example, by modifying the wording of certain items while keeping the specific population of interest in mind for item selection.

Fifth, psychometrically, another limitation of the present dissertation is the lack of investigation into test-retest reliability. Test-retest reliability refers to the consistency of a measure over time, ensuring that results obtained from participants are stable and reliable across repeated administrations (Polit, 2014). This is particularly concerning if constructs measured by the MPFI and MPFI-S are conceptualized as traits or stable behavioral repertoires as their assessment methods imply. Without examining test-retest reliability, it

remains unclear whether the results obtained in this study are consistent over time or subject to fluctuations.

Sixth, the current study did not explore the predictive validity of psychological flexibility and inflexibility, particularly with regard to behavioral health outcomes. Given their clinical focus, strong predictive validity should be considered as the important psychometric quality of MPFI and MPFI-S. For example, in the context of CBS and functional contextualism, the validity of psychological flexibility and inflexibility is determined by their effectiveness in achieving pragmatic goals (i.e., Truth criteria in CBS), often tied to changes in mental health outcomes (Hayes et al., 2007). Although the current dissertation project examined the cross-sectional relationships between psychological flexibility/inflexibility and various mental health indicators, such as depression, anxiety, and negative affect, it did not explore their predictive role. As such, future studies should investigate the extent to which psychological flexibility/inflexibility measured at point 1 predict mental health outcomes at different points in time (Ciarrochi et al., 2022).

Finally, the results of this study may be limited by the fact that the sample for Study 1 was recruited during the COVID-19 pandemic (i.e., 2022-2023). As noted in previous studies (Kroska et al., 2020; McCracken et al., 2021), the pandemic appeared to have significantly impacted psychological flexibility and inflexibility of many individuals. Although the psychometric properties of the original MPFI in Study 1 and the 36-item MPFI-S in Study 2 were generally consistent with those found in the original MPFI validation study (Rolffs et al., 2018), which was completed prior to the COVID-19 pandemic, it is important to consider whether the present findings can be replicated with another Hawai'i-based samples recruited during a time of less widespread disruption.

4.7. Conclusion

The present dissertation project examined and validated the original 60-item MPFI using a racially and ethnically diverse sample of adults in Hawai‘i and developed a new shorter version of the MPFI (i.e., 36-item MPFI-S) through factor analyses and an IRT approach. The findings from the present dissertation project generally suggest that a two higher-order factor model, where each second-order factor includes six subfactors (first-order factor), is appropriate for both the original (MPFI) and shortened (MPFI-S) versions. Additionally, item-level functioning was found to be mostly excellent for both measures, with the IRT analyses providing decision criteria in the selection of final items for the MPFI-S. First-order and second-order factors in both versions of the MPFI demonstrated strong construct validity, with the exception of Experiential Avoidance. Furthermore, the strong psychometric qualities of MPFI and MPFI-S were observed in the present racially and ethnically diverse samples of adults in Hawai‘i, contribute to the growing body of research aimed at ensuring the psychometric quality of psychological flexibility and inflexibility measures that are culturally relevant and applicable to diverse populations. In sum, while caution is needed in interpreting the present findings and generalizing them to other diverse populations, this dissertation project makes a small and yet important contribution to setting a strong conceptual and empirical foundation for understanding the structure, item-level functioning, and applicability of the MPFI and MPFI-S as well as the study of psychological flexibility and psychological inflexibility in racial diversity.

Reference

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Table 1.1. Quality assessment of scales for psychological flexibility and inflexibility

Scales		Measured constructs	Measurement quality assessment retrieved and expanded from Cherry et al. (2021)							COSMIN IRT Checklist				Hexaflex Account
			Content validity	Internal consistency	Discriminant validity	Test-retest reliability	Interpretability	Definition/Measure alignment	Total	A	B	C	D	--
1	AAQ-II	PF, PI	2	2	0	2	1	0	7	✓				
2	AFQ-Y	PF, PI	2	2	2	0	1	0	7	✓	✓		✓	
3	CompACT	PF	2	2	2	0	0	2	8	✓	✓	✓	✓	
4	BEAQ	PF	1	2	2	0	1	0	6	✓	✓	✓	✓	
5	OESQ	PF	1	2	2	0	0	0	5					
6	EPIC	PI	2	2	0	0	0	0	4					
7	PPFI	PF	2	2	2	2	1	2	11					
8	PsyFlex	PF	2	2	2	0	1	2	9					
9	MPFI	PF, PI	2	2	2	0	2	2	10	✓	✓		✓	✓

Note: AAQ-II = Acceptance and Action Questionnaire-II; AFQ-Y = Avoidance and Fusion Questionnaire for Youth; CFS = Cognitive Flexibility Scale; CFI = Cognitive Flexibility Inventory; MPFI = Multidimensional Psychological Flexibility Inventory; CompACT = Comprehensive Assessment of Acceptance and Commitment Therapy Process; BEAQ = Brief Experiential Avoidance Questionnaire; OESQ = Open and Engaged State Questionnaire; EPIC = Everyday Psychological Inflexibility Checklist; PPFI = Personalized Psychological Flexibility Inventory; PF = psychological flexibility; PI = psychological inflexibility; CF = cognitive flexibility; 2 = criterion fulfilled; 1 = criterion partially fulfilled; 0 = criterion unfulfilled or no information available (informed by Strauss et al., 2016; Terwee et al., 2007); COSMIN IRT Checklist (Mokkink et al., 2010; A. Was the IRT model used adequately described?; B. Was the computer software package used adequately described?; C. Was the method of estimation used adequately described?; D. Were the assumptions for estimating parameters of the IRT model checked?)

Table 1.2. The list of R packages

Name	Version	Description
dplyr	1.1.0	Provide a function for each basic verb of data manipulation
lattice	0.20-45	Improve on base R graphics by providing better defaults and the ability to easily display multivariate relationships
lavaan	0.6-14	Fit a variety of latent variable models, including confirmatory factor analysis, structural equation modeling and latent growth curve models
ltm	1.2-0	Analysis of multivariate dichotomous and polytomous data using latent trait models under the Item Response Theory approach (e.g., the Graded Response, and the Generalized Partial Credit Models)
mirt	1.37.1	Analysis of dichotomous and polytomous response data using unidimensional and multidimensional latent trait models under the Item Response Theory paradigm
naniar	0.5.0	Data structures, summaries, and visualizations for missing data
psych	2.2.3	Multivariate analysis and scale construction using factor analysis, principal component analysis, cluster analysis and reliability analysis, and basic descriptive statistics
semPlot	1.1.6	Path diagrams and visual analysis of various SEM packages' output
semTools	0.5.6	Provides tools for structural equation modeling, many of which extend the 'lavaan' package (e.g., pool results from multiple imputations, probe latent interactions, or test measurement invariance)
stats4	3.6.2	This package contains functions and classes for statistics using the S version 4 class system supporting maximum likelihood including methods for logLik for use with AIC

Table 1.3. Overview of analytic procedures in the two phases

Study 1. Validation of the original MPFI and selection of items	
1. Validation for Hawaiian sample with factory analysis	EFA with the first half of sample (i.e., Sample 1 = 360)
	CFA with the second half of sample (i.e., Sample 2 = 359)
2. The application of Item Response Theory	Generalized Partial Credit Model
	High level of item information for the efficiency of the scale (e.g., Discrimination (a) > 0.65)
	Item fit with Plausible-Value Imputation Statistics (i.e., PV-Q1)
	Broad range of psychological flexibility and inflexibility (e.g., $-3 < \text{Theta } (\theta) < 3$)
	Appropriate number of categories
3. Measurement Invariance across groups (e.g., gender and ethnicity)	Configural, equivalence of model form
	Metric (weak factorial), equivalence of factor loadings
	Scalar (strong factorial), equivalence of item intercepts or thresholds
	Partial invariance at the item level, if applicable
4. Validity evidence of original MPFI based on the relationship with other constructs	Convergent validity
	Discriminant validity
5. Final selection of items for short form of MPFI	Content validity based on the consultation with expert in the field
	Consideration for the practical usage of the short MPFI (e.g., 3 items for each factor for structural equation modeling)

Study 2. Validation of short MPFI in a new sample	
1. Confirmation of original factor structure	CFA with the entire sample (N = 698)
2. Examination of item functioning identified in Study 1	Examination of item information and item category curves
3. Comparison with the original MPFI	CFA model fit
	Comparison of mean scores
	Bias index (i.e., subtraction the mean of absolute θ in revised scale from the mean of absolute θ in original scale)
4. Validity evidence based on the relationship with other constructs	Convergent validity with CFQ, QUEST, and ELS
	Discriminant validity with BFI (Neuroticism) and PANAS (Negative affect)

Table 2.1. Demographic background

Characteristic	Total (<i>n</i> = 719)	
	<i>M</i>	<i>SD</i>
Age	20.48	3.93
<hr/>		
	Percent	<i>N</i>
Gender		
Male	26.01	187
Female	72.46	521
Other	1.53	11
Sexual Identity		
Heterosexual	75.24	541
Homosexual	5.98	43
Bisexual	14.74	106
Other	4.03	29
Race/Ethnicity		
Native American	.70	5
Latinx	7.51	54
Asian	35.05	252
Pacific Islander	2.50	18
White (non-Hispanic)	30.46	219
Black (non-Hispanic)	1.39	10
Hawaiian	2.78	20
Other	.42	3
Biracial/Multicultural	19.19	138
Family Background		
Poor	5.43	39
Working Class	22.01	158
Middle Class	46.10	331
Upper Middle Class	22.42	161
Wealthy	4.04	29

Table 2.2. MPFI item descriptive statistics

Items		Sample1				Sample2	
		<i>M(SD)</i>	<i>r_{ix}</i>	<i>r_{i(x-i)}</i>	<i>α</i> If deleted	<i>α</i>	<i>ω</i>
Acceptance						0.83	0.87
MPFI 1	I was receptive to observing unpleasant thoughts and feelings without interfering with them.	3.2(1.2)	.44	.39	.84		
MPFI 2	I tried to make peace with my negative thoughts and feelings rather than resisting them.	3.6(1.2)	.68	.62	.78		
MPFI 3	I made room to fully experience negative thoughts and emotions, breathing them in rather than pushing them away.	3.4(1.3)	.78	.70	.75		
MPFI 4	When I had an upsetting thought or emotion, I tried to give it space rather than ignoring it.	3.5(1.2)	.80	.72	.75		
MPFI 5	I opened myself to all of my feelings, the good and the bad.	3.9(1.3)	.72	.63	.78		
Present Moment Awareness						0.92	0.94
MPFI 6	I was attentive and aware of my emotions.	4.1(1.1)	.81	.77	.90		
MPFI 7	I was in tune with my thoughts and feelings from moment to moment.	3.9(1.2)	.84	.80	.90		
MPFI 8	I paid close attention to what I was thinking and feeling.	3.9(1.2)	.86	.82	.89		
MPFI 9	I was in touch with the ebb and flow of my thoughts and feelings.	3.8(1.2)	.87	.83	.89		
MPFI 10	I strived to remain mindful and aware of my own thoughts and emotions.	4.0(1.2)	.75	.72	.91		
Self as Context						0.91	0.93
MPFI 11	Even when I felt hurt or upset, I tried to maintain a broader perspective.	3.9(1.3)	.80	.77	.92		
MPFI 12	I carried myself through tough moments by seeing my life from a larger viewpoint.	3.9(1.3)	.84	.81	.91		
MPFI 13	I tried to keep perspective even when life knocked me down.	4.0(1.2)	.89	.86	.90		
MPFI 14	When I was scared or afraid, I still tried to see the larger picture.	3.8(1.2)	.86	.83	.91		

MPFI 15	When something painful happened, I tried to take a balanced view of the situation.	3.7(1.2)	.84	.81	.91		
Defusion						0.9	0.92
MPFI 16	I was able to let negative feelings come and go without getting caught up in them.	3.3(1.3)	.85	.81	.91		
MPFI 17	When I was upset, I was able to let those negative feelings pass through me without clinging to them.	3.2(1.3)	.87	.83	.90		
MPFI 18	When I was scared or afraid, I was able to gently experience those feelings, allowing them to pass.	3.4(1.2)	.81	.78	.91		
MPFI 19	I was able to step back and notice negative thoughts and feelings without reacting to them.	3.2(1.3)	.85	.81	.91		
MPFI 20	In tough situations, I was able to notice my thoughts and feelings without getting overwhelmed by them.	3.3(1.2)	.82	.79	.91		
Values						0.92	0.94
MPFI 21	I was very in-touch with what is important to me and my life.	4.2(1.2)	.81	.76	.88		
MPFI 22	I stuck to my deeper priorities in life.	4.0(1.2)	.83	.78	.87		
MPFI 23	I tried to connect with what is truly important to me on a daily basis.	4.0(1.2)	.79	.74	.88		
MPFI 24	Even when it meant making tough choices, I still tried to prioritize the things that were important to me.	4.2(1.1)	.80	.76	.88		
MPFI 25	My deeper values consistently gave direction to my life.	4.2(1.2)	.75	.71	.89		
Committed Action						0.94	0.95
MPFI 26	Even when I stumbled in my efforts, I didn't quit working toward what is important.	4.3(1.1)	.82	.79	.92		
MPFI 27	Even when times got tough, I was still able to take steps toward what I value in life.	4.2(1.1)	.86	.83	.91		
MPFI 28	Even when life got stressful and hectic, I still worked toward things that were important to me.	4.2(1.1)	.88	.84	.91		
MPFI 29	I didn't let set-backs slow me down in taking action toward what I really want in life.	4.0(1.2)	.88	.84	.91		
MPFI 30	I didn't let my own fears and doubts get in the way of taking action toward my goals.	3.9(1.2)	.80	.77	.92		

Experiential Avoidance						0.91	0.93
MPFI 31	When I had a bad memory, I tried to distract myself to make it go away.	3.7(1.3)	.82	.79	.93		
MPFI 32	I tried to distract myself when I felt unpleasant emotions.	3.7(1.2)	.87	.85	.92		
MPFI 33	When unpleasant memories came to me, I tried to put them out of my mind.	3.7(1.3)	.89	.86	.92		
MPFI 34	When something upsetting came up, I tried very hard to stop thinking about it.	3.6(1.3)	.88	.85	.92		
MPFI 35	If there was something I didn't want to think about, I would try many things to get it out of my mind.	3.6(1.3)	.84	.81	.93		
Lack of Contact with Present Moment Awareness						0.96	0.97
MPFI 36	I did most things on "automatic" with little awareness of what I was doing.	3.2(1.3)	.86	.83	.94		
MPFI 37	I did most things mindlessly without paying much attention.	3.0(1.2)	.90	.87	.94		
MPFI 38	I went through most days on auto-pilot without paying much attention to what I was thinking or feeling.	3.0(1.4)	.91	.89	.93		
MPFI 39	I floated through most days without paying much attention.	2.9(1.3)	.89	.87	.94		
MPFI 40	Most of the time I was just going through the motions without paying much attention.	3.0(1.3)	.87	.85	.94		
Self as Contents						0.95	0.96
MPFI 41	I thought some of my emotions were bad or inappropriate and I shouldn't feel them.	2.9(1.3)	.81	.78	.93		
MPFI 42	I criticized myself for having irrational or inappropriate emotions.	3.0(1.3)	.84	.81	.92		
MPFI 43	I believed some of my thoughts are abnormal or bad and I shouldn't think that way.	2.8(1.3)	.87	.85	.92		
MPFI 44	I told myself that I shouldn't be feeling the way I'm feeling.	2.9(1.4)	.89	.85	.92		
MPFI 45	I told myself I shouldn't be thinking the way I was thinking.	2.9(1.3)	.88	.84	.92		
Fusion						0.95	0.96

MPFI 46	Negative thoughts and feelings tended to stick with me for a long time.	3.3(1.4)	.86	.83	.94		
MPFI 47	Distressing thoughts tended to spin around in my mind like a broken record.	3.3(1.5)	.91	.88	.93		
MPFI 48	It was very easy to get trapped into unwanted thoughts and feelings.	3.4(1.4)	.90	.88	.93		
MPFI 49	When I had negative thoughts or feelings it was very hard to see past them.	3.2(1.4)	.89	.87	.94		
MPFI 50	When something bad happened it was hard for me to stop thinking about it.	3.5(1.4)	.86	.84	.94		
Lack of Contact with Values						0.9	0.92
MPFI 51	My priorities and values often fell by the wayside in my day to day life.	2.7(1.1)	.77	.72	.87		
MPFI 52	When life got hectic, I often lost touch with the things I value.	2.7(1.2)	.83	.78	.86		
MPFI 53	The things that I value the most often fell off my priority list completely.	2.3(1.1)	.81	.76	.86		
MPFI 54	I didn't usually have time to focus on the things that are really important to me.	2.8(1.2)	.73	.69	.88		
MPFI 55	When times got tough, it was easy to forget about what I truly value.	2.6(1.3)	.78	.74	.87		
Inaction						0.94	0.96
MPFI 56	Negative feelings often trapped me in inaction.	2.9(1.4)	.87	.85	.94		
MPFI 57	Negative feelings easily stalled out my plans.	2.9(1.4)	.89	.87	.93		
MPFI 58	Getting upset left me stuck and inactive.	2.9(1.4)	.89	.87	.93		
MPFI 59	Negative experiences derailed me from what's really important.	2.7(1.3)	.87	.85	.94		
MPFI 60	Unpleasant thoughts and feelings easily overwhelmed my efforts to deepen my life.	2.8(1.4)	.88	.85	.94		

Note: MPFI, Multidimensional Psychological Flexibility Inventory; r_{ix} , Point-polyserial correlation coefficient; $r_{i(x-i)}$, Deleted point-polyserial correlation coefficient; ω , McDonald's ω ; α , Cronbach's α

Table 2.3. Parallel analysis and minimum average partial (MAP) test

Component/ Factor	Initial Eigenvalues			Parallel Aalsysis		MAP
	Eigenvalues	Proportion of Variance	Cumulative Proportion	Real data	Percentile	
1	21.28	.35	.35	21.05	1.31	.0109
2	6.07	.10	.46	5.85	1.19	.0069
3	4.23	.07	.53	3.98	1.11	.0050
4	3.89	.06	.59	3.68	1.05	.0031
5	2.86	.05	.64	2.64	.98	.0019
6	2.27	.04	.68	2.06	.93	.0010
7	1.72	.03	.71	1.46	.88	.0008
8	1.36	.02	.73	1.12	.84	.0006
9	1.19	.02	.75	.95	.80	.0006
10	1.05	.02	.77	.79	.76	.0006
11	.98	.02	.78	.75	.72	.0006
12	.88	.01	.80	.60	.68	.0006
13	.81	.01	.81	.41	.65	.0008
14	.58	.01	.82	.32	.61	.0008
15	.53	.01	.83	.28	.57	.0008

Note: Parallel analysis compares the eigenvalues obtained from the observed data with those obtained from the random data. The idea is to retain as many factors as have eigenvalues from the observed data that exceed the corresponding eigenvalues from the random data. The MAP test looks for a point where adding more components does not significantly reduce the average partial correlations, suggesting that additional components do not contribute substantially to explaining the observed relationships among the variables.

Table 2.4. Standardized loadings (pattern matrix) based upon correlation matrix

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	Communality	Uniqueness	Complexity
MPFI 1	.36	.04	.03	.19	-.09	.07	.02	.14	.04	.07	-.07	.04	.21	.79	2.5
MPFI 2	.52	-.02	.17	.19	.04	-.09	-.02	-.04	-.07	.03	.08	-.1	.53	.47	1.8
MPFI 3	.81	-.04	-.04	.03	-.02	.06	-.09	.03	.01	-.01	-.1	.02	.7	.3	1.1
MPFI 4	.76	.1	.04	0	.04	-.03	0	-.03	0	-.02	.08	-.09	.72	.28	1.1
MPFI 5	.59	.13	.06	.02	.12	.04	-.05	-.08	-.12	-.01	.08	.09	.64	.36	1.5
MPFI 6	.11	.71	.06	-.09	-.02	.12	-.01	-.02	.06	-.07	-.12	.11	.69	.31	1.3
MPFI 7	-.07	.82	-.05	.1	.07	.06	.01	.01	-.05	-.03	-.05	0	.8	.2	1.1
MPFI 8	.02	.87	-.02	.03	.07	-.07	-.01	-.08	-.02	.06	.01	-.01	.84	.16	1.1
MPFI 9	.03	.81	.07	.01	.01	.03	-.03	-.01	.01	.01	.09	-.07	.8	.2	1.1
MPFI 10	.15	.54	.22	-.02	-.04	.08	.05	-.04	-.03	0	.03	-.05	.62	.38	1.6
MPFI 11	.07	.06	.72	.14	-.03	-.08	.05	-.02	.01	-.05	-.07	.04	.69	.31	1.2
MPFI 12	.01	.01	.83	-.01	.03	.05	.03	-.03	-.08	.04	.01	.03	.76	.24	1
MPFI 13	-.02	-.04	.87	0	.04	.03	-.02	-.01	-.01	0	-.01	-.02	.81	.19	1
MPFI 14	-.02	.04	.79	.04	0	.08	-.03	.02	.03	-.03	0	-.01	.76	.24	1
MPFI 15	.05	.04	.71	.06	.04	0	-.01	-.02	.04	-.03	.03	-.08	.71	.29	1.1
MPFI 16	-.02	.03	.17	.66	.02	.01	-.02	-.04	.06	-.14	0	-.04	.77	.23	1.3
MPFI 17	.01	.02	.03	.79	-.02	.04	-.05	-.05	.03	-.15	-.04	.07	.81	.19	1.1
MPFI 18	.09	.02	.09	.65	.01	.05	.06	-.01	.03	-.08	-.06	-.03	.69	.31	1.2
MPFI 19	.07	.03	.03	.75	0	.05	-.02	.03	-.06	.06	-.03	-.09	.73	.27	1.1
MPFI 20	.05	.06	.03	.69	.1	.06	.05	0	-.13	.04	.1	-.08	.74	.26	1.3
MPFI 21	.03	.13	-.02	.03	.66	.06	-.01	.04	0	-.08	-.12	.02	.7	.3	1.2
MPFI 22	.01	.03	.12	-.02	.78	0	-.04	-.04	.01	.02	0	-.07	.77	.23	1.1
MPFI 23	.06	.08	-.03	.07	.65	.08	.01	-.04	.05	-.04	-.05	-.02	.67	.33	1.1
MPFI 24	.03	0	.07	.01	.5	.28	.07	-.02	-.05	-.05	-.1	.04	.68	.32	1.8
MPFI 25	.07	.04	.14	-.05	.42	.3	.1	.07	-.09	-.02	-.04	-.01	.63	.37	2.6
MPFI 26	.04	-.01	-.04	.04	.09	.78	.04	-.05	0	.05	.06	-.07	.72	.28	1.1
MPFI 27	.02	.01	.07	.02	.06	.79	-.03	-.02	.05	0	-.04	.02	.79	.21	1
MPFI 28	.04	.04	0	-.01	-.04	.88	.02	-.02	.03	-.03	-.06	.01	.83	.17	1
MPFI 29	-.02	.01	.06	.05	.05	.77	-.03	-.02	-.07	0	.01	-.06	.82	.18	1.1
MPFI 30	-.09	.08	.09	.07	.03	.66	-.05	.01	-.06	-.07	.03	-.05	.71	.29	1.2
MPFI 31	.04	.01	-.04	-.05	-.06	.04	.86	.02	-.03	-.02	-.01	0	.71	.29	1

MPFI 32	-.05	-.01	.05	-.01	.02	-.02	.85	.08	0	.08	-.05	-.02	.79	.21	1.1
MPFI 33	-.02	-.03	-.02	.06	.02	-.03	.92	-.05	0	-.07	.01	.06	.84	.16	1
MPFI 34	-.02	.02	0	.02	-.02	.02	.87	0	.06	.01	.05	-.04	.8	.2	1
MPFI 35	-.01	-.01	.03	-.05	.05	-.03	.82	-.02	.01	.05	0	.01	.72	.28	1
MPFI 36	.04	-.03	0	-.01	.05	.02	.02	.86	.03	-.08	.05	.06	.78	.22	1.1
MPFI 37	.03	-.03	-.01	.01	.07	-.11	-.01	.86	.03	-.07	.06	.05	.83	.17	1.1
MPFI 38	0	-.04	.01	-.04	-.03	.03	.01	.92	-.02	.04	-.03	-.01	.88	.12	1
MPFI 39	-.01	-.02	0	-.01	-.03	0	-.02	.9	-.01	.08	-.03	-.04	.85	.15	1
MPFI 40	-.06	.05	-.04	.04	-.05	-.01	.02	.87	0	.04	.02	-.01	.81	.19	1
MPFI 41	-.01	.04	-.01	.05	-.02	-.02	.07	.12	.82	-.04	0	-.01	.73	.27	1.1
MPFI 42	.06	.03	.02	-.1	-.06	.02	.03	-.02	.82	0	-.02	.04	.74	.26	1.1
MPFI 43	-.02	-.07	-.01	0	0	.04	-.02	.01	.85	.08	.01	-.03	.8	.2	1
MPFI 44	-.02	-.01	-.01	-.01	.04	-.04	.01	-.01	.85	.06	.04	-.03	.8	.2	1
MPFI 45	-.03	-.02	-.02	.04	.05	0	-.01	-.06	.86	.07	.02	.05	.81	.19	1
MPFI 46	.06	-.01	-.07	-.05	0	-.07	.02	.01	.07	.71	.01	.07	.77	.23	1.1
MPFI 47	.01	-.03	-.01	-.02	-.05	.01	.03	.01	.06	.79	.03	.06	.84	.16	1
MPFI 48	-.03	.01	.02	.02	-.03	-.03	-.02	.05	.08	.81	0	.07	.84	.16	1.1
MPFI 49	-.06	0	-.03	-.08	.01	.04	.01	.02	.06	.71	.03	.12	.83	.17	1.1
MPFI 50	-.03	.05	-.02	-.12	.02	-.02	.05	.02	.04	.72	.05	.05	.78	.22	1.1
MPFI 51	0	0	-.07	.03	-.08	-.05	.05	.12	.06	.07	.6	.03	.63	.37	1.2
MPFI 52	-.03	-.09	-.06	.03	-.04	0	.01	.02	-.08	.23	.69	.07	.77	.23	1.4
MPFI 53	.06	.05	.02	-.12	-.1	-.05	.03	.04	.12	-.03	.71	.05	.71	.29	1.2
MPFI 54	-.01	.01	.03	-.07	-.14	.01	-.04	.19	.07	-.1	.45	.25	.56	.44	2.5
MPFI 55	-.08	-.05	-.01	.05	-.06	-.03	-.02	.04	.11	-.02	.56	.24	.68	.32	1.6
MPFI 56	-.01	-.03	.03	-.05	-.01	-.08	.01	.05	.01	.09	-.02	.77	.82	.18	1.1
MPFI 57	-.01	0	-.07	.03	0	-.02	-.03	.02	-.01	.1	0	.82	.84	.16	1.1
MPFI 58	-.01	.02	.03	-.04	-.07	-.01	.04	.04	-.01	.07	-.02	.84	.86	.14	1
MPFI 59	-.01	-.02	-.02	-.02	-.02	-.03	.05	-.03	.04	-.03	.18	.75	.8	.2	1.2
MPFI 60	.01	-.05	-.07	-.04	.06	-.02	-.02	.03	.12	.09	.11	.66	.79	.21	1.2

Table 2.5. Measurement Invariance by Gender and Race

Model	AIC	BIC	<i>df</i>	χ^2	CFI	RMSEA	$\Delta\chi^2$	Δ CFI	Δ RMSEA
Gender – Psychological Flexibility									
Configural	54411	55287	798	2113.3	.911	.068	NA	NA	NA
Metric	54385	55128	827	2144.4	.911	.067	31.047	< .001	.001
Scalar	54406	55044	850	2211.6**	.908	.067	67.157	.003	< .001
Strict	54445	54946	880	2310.7**	.903	.068	99.104	.005	0.001
Gender – Psychological Inflexibility									
Configural	54943	55818	798	2066.6	.932	.067	NA	NA	NA
Metric	54909	55652	827	2091	.932	.066	24.38	< .001	.001
Scalar	54894	55533	850	2122.6	.932	.065	31.547	< .001	.001
Strict	54956	55458	880	2244**	.927	.066	121.38	.005	.001
Race – Psychological Flexibility									
Configural	55509	56827	119	2608.2	.907	.07	NA	NA	NA
Metric	55452	56505	125	2667.3	.907	.069	59.057	< .001	.002
Scalar	55429	56271	130	2736.1*	.906	.068	68.829	.001	.001
Strict	55418	55986	136	2845**	.903	.067	108.90	.003	< .001
Race – Psychological Inflexibility									
Configural	56035	57353	119	2552.4	.929	.069	NA	NA	NA
Metric	55973	57025	125	2605.5	.929	.067	53.169	< .001	.002
Scalar	55911	56753	130	2635.8	.93	.065	30.279	.001	.002
Strict	55894	56461	136	2738.8**	.928	.065	103.01	.002	< .001

* $p < .05$; ** $p < .01$

Note: There are two groups for gender (Male and Female) and three groups for race (White, Asian, Other)

Table 2.6. Item parameters estimated by GPCM

Item	Item Parameter Estimates						Item Fit Indices			
	<i>a</i>	<i>b</i> ₁	<i>b</i> ₂	<i>b</i> ₃	<i>b</i> ₄	<i>b</i> ₅	S χ^2	<i>df</i>	RMSEA	<i>p</i>
Acceptance										
MPFI 1	.50	-2.14	-1.90	1.44	2.15	2.90	98.82	48	.04	< .01
MPFI 2	1.16	-2.53	-1.25	-.09	.90	2.00	68.00	37	.04	< .01
MPFI 3	1.83	-1.72	-0.74	.21	.71	1.91	56.90	35	.03	.01
MPFI 4	2.37	-2.06	-0.83	.06	.95	2.09	43.01	29	.03	.05
MPFI 5	1.14	-2.92	-1.44	-.43	.52	1.26	56.36	38	.03	.03
Present Moment Awareness										
MPFI 6	2.06	-2.91	-1.64	-.63	.21	1.21	45.63	27	.03	.01
MPFI 7	2.84	-2.57	-1.25	-.39	.51	1.36	23.96	22	.01	.35
MPFI 8	3.03	-2.32	-1.23	-.43	.33	1.29	33.58	22	.03	.05
MPFI 9	3.09	-2.30	-1.04	-.18	.55	1.46	25.20	22	.02	.29
MPFI 10	1.54	-2.78	-1.51	-.59	.32	1.35	52.97	31	.03	.01
Self as Context										
MPFI 11	1.65	-3.01	-1.24	-.41	.35	1.44	43.90	30	.03	.05
MPFI 12	2.23	-2.44	-1.25	-.41	.29	1.32	33.19	27	.02	.19
MPFI 13	3.38	-2.33	-1.37	-.46	.32	1.21	45.67	22	.04	< .01
MPFI 14	3.09	-2.10	-1.12	-.30	.38	1.28	27.37	23	.02	.24
MPFI 15	2.03	-2.31	-1.20	-.22	.49	1.45	45.21	29	.03	.03
Defusion										
MPFI 16	2.45	-1.85	-.54	.38	1.01	1.74	45.89	27	.03	.01
MPFI 17	2.65	-1.98	-.50	.28	1.09	1.83	54.45	24	.04	< .01
MPFI 18	1.86	-2.19	-.74	.24	1.08	1.69	49.65	30	.03	.01
MPFI 19	1.93	-2.00	-.59	.46	.99	2.00	37.49	30	.02	.16
MPFI 20	2.05	-1.98	-.71	.24	1.15	1.90	54.96	25	.04	< .01
Values										
MPFI 21	2.20	-2.45	-1.47	-.55	.11	1.08	39.50	30	.02	.12
MPFI 22	2.90	-2.28	-1.22	-.51	.26	1.15	21.37	25	.00	.67
MPFI 23	2.30	-2.22	-1.39	-.47	.35	1.00	27.68	27	.01	.43
MPFI 24	1.93	-2.80	-1.71	-.66	.12	1.18	27.42	28	.00	.50
MPFI 25	1.55	-2.52	-1.65	-.57	.29	.84	53.07	34	.03	.02
Committed Action										
MPFI 26	2.51	-2.75	-1.57	-.70	.10	1.11	34.81	23	.03	.05
MPFI 27	3.64	-2.47	-1.55	-.67	.17	1.05	16.99	20	.00	.65
MPFI 28	4.38	-2.62	-1.56	-.68	.17	.94	40.78	19	.04	< .01
MPFI 29	2.83	-2.62	-1.37	-.44	.42	1.23	29.99	21	.03	.09
MPFI 30	1.84	-2.83	-1.43	-.31	.52	1.28	42.48	28	.03	.04
Experiential Avoidance										
MPFI 31	1.58	-2.21	-.92	-.14	.57	1.54	72.95	34	.04	< .01
MPFI 32	2.47	-2.14	-.97	-.18	.55	1.60	32.98	23	.03	.08
MPFI 33	3.22	-2.02	-.99	-.18	.64	1.41	43.25	22	.04	< .01
MPFI 34	3.21	-1.88	-.82	-.06	.51	1.40	32.68	25	.02	.14
MPFI 35	1.84	-1.91	-.80	.02	.53	1.45	53.15	33	.03	.02
Lack of Contact with Present Moment Awareness										
MPFI 36	2.69	-1.57	-.34	.45	.95	1.72	49.43	24	.04	< .01
MPFI 37	3.72	-1.34	-.19	.51	1.02	1.83	31.32	21	.03	0.07

MPFI 38	4.10	-1.13	-.09	.50	1.07	1.86	43.25	19	.04	< .01
MPFI 39	4.34	-1.06	-.12	.49	1.01	1.83	30.37	20	.03	0.06
MPFI 40	3.80	-1.18	-.11	.45	1.01	1.71	42.05	21	.04	< .01
Self as Contents										
MPFI 41	2.10	-1.10	-.06	.64	1.05	2.08	68.94	31	.04	< .01
MPFI 42	2.34	-1.17	-.20	.50	1.04	1.89	52.50	28	.04	< .01
MPFI 43	3.09	-.92	-.05	.60	1.07	2.04	28.55	23	.02	.20
MPFI 44	3.70	-.95	-.24	.49	.97	1.95	37.02	23	.03	.03
MPFI 45	3.71	-1.07	-.28	.53	.95	1.92	48.22	22	.04	< .01
Fusion										
MPFI 46	2.59	-1.55	-.36	.27	.88	1.54	45.40	26	.03	.01
MPFI 47	3.64	-1.26	-.39	.30	.73	1.51	32.46	24	.02	.12
MPFI 48	3.85	-1.35	-.51	.21	.64	1.48	30.04	23	.02	.15
MPFI 49	3.60	-1.31	-.35	.39	.81	1.57	58.79	23	.05	< .01
MPFI 50	2.54	-1.57	-.71	.17	.67	1.36	50.76	28	.04	.01
Lack of Contact with Values										
MPFI 51	1.69	-1.45	-.02	1.03	1.69	2.53	29.79	29	.01	.43
MPFI 52	2.85	-1.10	.17	.79	1.27	2.23	29.74	23	.02	.16
MPFI 53	2.36	-.73	.51	1.19	1.58	2.14	39.52	29	.02	.09
MPFI 54	1.45	-1.26	.05	.82	1.45	2.48	38.07	35	.01	.33
MPFI 55	2.08	-1.02	.20	.78	1.24	2.22	40.54	29	.03	.08
Inaction										
MPFI 56	2.91	-1.09	-.04	.63	.99	1.83	30.35	26.0	.02	.25
MPFI 57	3.42	-1.02	-.01	.52	.97	1.94	20.94	25	.00	.70
MPFI 58	3.10	-.97	-.09	.57	.89	1.72	26.40	25	.01	.39
MPFI 59	2.69	-.91	.09	.74	1.12	1.96	33.61	29	.02	.25
MPFI 60	2.87	-.98	.02	.75	.97	1.75	32.82	26	.02	.17

Note: a , item discrimination parameter; b_1 - b_5 , item threshold parameter

Table 2.7. Correlations among MPFI factors

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 MPFI-1 Acceptance	-													
2 MPFI-2 Present Awareness	.61**	-												
3 MPFI-3 Self as Context	.51**	.59**	-											
4 MPFI-4 Defusion	.49**	.44**	.62**	-										
5 MPFI-5 Values	.45**	.62**	.61**	.51**	-									
6 MPFI-6 Committed Action	.40**	.51**	.60**	.54**	.76**	-								
7 MPFI-7 Experiential Avoidance	-.11**	-.06	.04	-.09*	.05	.05	-							
8 MPFI-8 Lack of Awareness	-.11**	-.27**	-.19**	-.23**	-.27**	-.26**	.29**	-						
9 MPFI-9 Self as Contents	-.18**	-.18**	-.23**	-.39**	-.25**	-.26**	.29**	.47**	-					
10 MPFI-10 Fusion	-.16**	-.17**	-.32**	-.57**	-.26**	-.34**	.27**	.49**	.66**	-				
11 MPFI-11 Lack of Values	-.15**	-.26**	-.28**	-.29**	-.43**	-.48**	.18**	.54**	.54**	.61**	-			
12 MPFI-12 Inaction	-.15**	-.20**	-.33**	-.48**	-.37**	-.47**	.21**	.53**	.63**	.76**	.75**	-		
13 MPFI-PF Flexibility	.72**	.80**	.83**	.76**	.83**	.80**	-.02	-.28**	-.31**	-.38**	-.40**	-.42**	-	
14 MPFI-PI Inflexibility	-.19**	-.25**	-.29**	-.46**	-.34**	-.39**	.48**	.73**	.80**	.85**	.79**	.86**	-.41**	-

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

Table 2.8. Correlations between MPFI factor and related constructs

Variables	PPFI-av	PPFI-ac	PPFI-ha	PPFI	Psy-Flex	DTS-tl	DTS-ap	DTS-ab	DTS-re	DTS	DASS-d	DASS-a	DASS-s	DASS
1 MPFI-1 Acceptance	.22**	.38**	.08*	.32**	.37**	.21**	.29**	.23**	.22**	.29**	-.17**	-.06	-.13**	-.13**
2 MPFI-2 Present Awareness	.25**	.32**	.01	.28**	.36**	.17**	.25**	.18**	.12**	.23**	-.23**	-.12**	-.13**	-.18**
3 MPFI-3 Self as Context	.29**	.39**	.13**	.39**	.46**	.29**	.36**	.38**	.14**	.36**	-.32**	-.16**	-.23**	-.27**
4 MPFI-4 Defusion	.33**	.37**	.12**	.40**	.47**	.40**	.49**	.55**	.26**	.52**	-.48**	-.35**	-.44**	-.47**
5 MPFI-5 Values	.35**	.31**	.13**	.39**	.45**	.24**	.30**	.28**	.10**	.29**	-.37**	-.21**	-.19**	-.29**
6 MPFI-6 Committed Action	.44**	.39**	.19**	.50**	.46**	.31**	.34**	.36**	.14**	.35**	-.41**	-.25**	-.24**	-.34**
7 MPFI-7 Experiential Avoidance	-.21**	-.07	.10**	-.11**	-.07	-.20**	-.26**	-.18**	-.32**	-.28**	.10**	.15**	.15**	.15**
8 MPFI-8 Lack of Awareness	-.38**	-.14**	.11**	-.23**	-.26**	-.23**	-.35**	-.30**	-.23**	-.34**	.48**	.43**	.40**	.49**
9 MPFI-9 Self as Contents	-.33**	-.19**	.06	-.24**	-.29**	-.29**	-.52**	-.38**	-.24**	-.45**	.51**	.46**	.50**	.55**
10 MPFI-10 Fusion	-.44**	-.23**	0	-.35**	-.36**	-.40**	-.53**	-.56**	-.28**	-.54**	.60**	.49**	.55**	.61**
11 MPFI-11 Lack of Values	-.51**	-.16**	.03	-.35**	-.34**	-.31**	-.40**	-.38**	-.18**	-.39**	.53**	.41**	.41**	.51**
12 MPFI-12 Inaction	-.54**	-.24**	-.02	-.42**	-.37**	-.41**	-.55**	-.52**	-.27**	-.54**	.64**	.52**	.55**	.64**
13 MPFI-PF Flexibility	.40**	.45**	.14**	.48**	.54**	.34**	.43**	.42**	.20**	.43**	-.42**	-.24**	-.28**	-.36**
14 MPFI-PI Inflexibility	-.53**	-.23**	.06	-.38**	-.38**	-.41**	-.58**	-.52**	-.33**	-.57**	.64**	.55**	.58**	.66**

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

Note: PFI, Personalized Psychological Flexibility Index; PFI-av, Avoidance; PFI-ac, Acceptance; PFI-ha, Harnessing; DTS, Distress Tolerance Scale; DTS-tl, Tolerance; DTS-ap, Appraisal; DTS-ab, Absorption; DTS-re, Regulation; DASS, Depression Anxiety Stress Scales; DASS-d, Depression; DASS-a, Anxiety; DASS-s, Stress

Table 2.9. Selection of Items

	Item	Original	New	FA		IRT			Sum
				A	B	C	D	E	
Acceptance									
1	I was receptive to observing unpleasant thoughts and feelings without interfering with them.	✓		1	1	0	1	0	3
2	I tried to make peace with my negative thoughts and feelings rather than resisting them.	✓	✓	1	1	1	1	1	5
3	I made room to fully experience negative thoughts and emotions, breathing them in rather than pushing them away.		✓	1	1	1	1	1	5
4	When I had an upsetting thought or emotion, I tried to give it space rather than ignoring it.			1	1	1	1	1	5
5	I opened myself to all of my feelings, the good and the bad.		✓	1	1	1	1	1	5
Present Moment Awareness									
6	I was attentive and aware of my emotions.	✓		1	1	1	1	1	5
7	I was in tune with my thoughts and feelings from moment to moment.	✓	✓	1	1	1	1	1	5
8	I paid close attention to what I was thinking and feeling.		✓	1	1	1	1	1	5
9	I was in touch with the ebb and flow of my thoughts and feelings.		✓	1	1	1	1	1	5
10	I strived to remain mindful and aware of my own thoughts and emotions.			1	1	1	1	1	5
Self as Context									
11	Even when I felt hurt or upset, I tried to maintain a broader perspective.	✓	✓	1	1	1	1	1	5
12	I carried myself through tough moments by seeing my life from a larger viewpoint.	✓		1	1	1	1	1	5
13	I tried to keep perspective even when life knocked me down.		✓	1	1	1	1	1	5
14	When I was scared or afraid, I still tried to see the larger picture.			1	1	1	1	1	5
15	When something painful happened, I tried to take a balanced view of the situation.		✓	1	1	1	1	1	5
Defusion									
16	I was able to let negative feelings come and go without getting caught up in them.	✓	✓	1	1	1	1	1	5
17	When I was upset, I was able to let those negative feelings pass through me without clinging to them.	✓		1	1	1	1	1	5
18	When I was scared or afraid, I was able to gently experience those feelings, allowing them to pass.			1	1	1	1	1	5
19	I was able to step back and notice negative thoughts and feelings without reacting to them.		✓	1	1	1	1	1	5
20	In tough situations, I was able to notice my thoughts and feelings without getting overwhelmed by them.		✓	1	1	1	1	1	5

Value

21	I was very in-touch with what is important to me and my life.	✓		1	1	1	1	1	5
22	I stuck to my deeper priorities in life.	✓		1	1	1	1	1	5
23	I tried to connect with what is truly important to me on a daily basis.		✓	1	1	1	1	1	5
24	Even when it meant making tough choices, I still tried to prioritize the things that were important to me.		✓	1	1	1	1	1	5
25	My deeper values consistently gave direction to my life.		✓	1	1	1	1	1	5

Committed Action

26	Even when I stumbled in my efforts, I didn't quit working toward what is important.	✓		1	1	1	1	1	5
27	Even when times got tough, I was still able to take steps toward what I value in life.	✓		1	1	1	1	1	5
28	Even when life got stressful and hectic, I still worked toward things that were important to me.		✓	1	1	1	1	1	5
29	I didn't let set-backs slow me down in taking action toward what I really want in life.		✓	1	1	1	1	1	5
30	I didn't let my own fears and doubts get in the way of taking action toward my goals.		✓	1	1	1	1	1	5

Experiential Avoidance

31	When I had a bad memory, I tried to distract myself to make it go away.	✓		1	1	1	1	1	5
32	I tried to distract myself when I felt unpleasant emotions.	✓	✓	1	1	1	1	1	5
33	When unpleasant memories came to me, I tried to put them out of my mind.		✓	1	1	1	1	1	5
34	When something upsetting came up, I tried very hard to stop thinking about it.		✓	1	1	1	1	1	5
35	If there was something I didn't want to think about, I would try many things to get it out of my mind.			1	1	1	1	1	5

Lack of Contact with Present Moment Awareness

36	I did most things on "automatic" with little awareness of what I was doing.	✓	✓	1	1	1	1	1	5
37	I did most things mindlessly without paying much attention.	✓		1	1	1	1	1	5
38	I went through most days on auto-pilot without paying much attention to what I was thinking or feeling.		✓	1	1	1	1	1	5
39	I floated through most days without paying much attention.		✓	1	1	1	1	1	5
40	Most of the time I was just going through the motions without paying much attention.			1	1	1	1	1	5

Self as Contents

41	I thought some of my emotions were bad or inappropriate and I shouldn't feel them.	✓		1	1	1	1	1	5
42	I criticized myself for having irrational or inappropriate emotions.	✓	✓	1	1	1	1	1	5
43	I believed some of my thoughts are abnormal or bad and I shouldn't think that way.			1	1	1	1	1	5
44	I told myself that I shouldn't be feeling the way I'm feeling.		✓	1	1	1	1	1	5

45	I told myself I shouldn't be thinking the way I was thinking.	✓		1	1	1	1	1	5
Fusion									
46	Negative thoughts and feelings tended to stick with me for a long time.	✓		1	1	1	1	1	5
47	Distressing thoughts tended to spin around in my mind like a broken record.	✓	✓	1	1	1	1	1	5
48	It was very easy to get trapped into unwanted thoughts and feelings.	✓		1	1	1	1	1	5
49	When I had negative thoughts or feelings it was very hard to see past them.			1	1	1	1	1	5
50	When something bad happened it was hard for me to stop thinking about it.	✓		1	1	1	1	1	5
Lack of Contact with Value									
51	My priorities and values often fell by the wayside in my day to day life.	✓		1	1	1	1	1	5
52	When life got hectic, I often lost touch with the things I value.	✓	✓	1	1	1	1	1	5
53	The things that I value the most often fell off my priority list completely.		✓	1	1	1	1	1	5
54	I didn't usually have time to focus on the things that are really important to me.			1	1	1	1	1	5
55	When times got tough, it was easy to forget about what I truly value.	✓		1	1	1	1	1	5
Inaction									
56	Negative feelings often trapped me in inaction.	✓		1	1	1	1	1	5
57	Negative feelings easily stalled out my plans.	✓	✓	1	1	1	1	1	5
58	Getting upset left me stuck and inactive.			1	1	1	1	1	5
59	Negative experiences derailed me from what's really important.		✓	1	1	1	1	1	5
60	Unpleasant thoughts and feelings easily overwhelmed my efforts to deepen my life.		✓	1	1	1	1	1	5

Note: FA, Factor analysis; IRT, Item Response Theory Analysis; A, Does an item have a simple structure from EFA?; B, Does the relationship between an item and a factor in CFA have theoretical background?; C, Does an item have large information for given traits?; D, Does an item have adequate item fit?; E, Are the response categories working accurately?; Each category will be evaluated with 0 indicating the item does not satisfy the criteria and 1 indicating the item meets the requirement. The sum score will be calculated by adding up the five categories. Bolded items represent those with the three highest discrimination parameters.

Table 3.1. Demographic background

Characteristic	Total (<i>n</i> = 698)	
	<i>M</i>	<i>SD</i>
Age	19.79	3.63
<hr/>		
	Percent	<i>N</i>
Gender		
Male	26.12	181
Female	72.72	504
Other	1.15	8
Sexual Identity		
Heterosexual	77.92	540
Homosexual	3.89	27
Bisexual	14.29	99
Other	3.89	27
Race/Ethnicity		
Native American	.43	3
Latinx	7.94	55
Asian	36.94	256
Pacific Islander	3.30	21
White (non-Hispanic)	29.72	206
Black (non-Hispanic)	1.87	13
Hawaiian	3.32	23
Other	.86	6
Biracial/Multicultural	15.87	110
Family Background		
Poor	5.05	35
Working Class	23.23	161
Middle Class	44.87	311
Upper Middle Class	24.09	167
Wealthy	2.74	19

Table 3.2. Item parameters of MPFI-S estimated by GPCM

Item	Item Parameter Estimates						Item Fit Indices			
	<i>a</i>	<i>b₁</i>	<i>b₂</i>	<i>b₃</i>	<i>b₄</i>	<i>b₅</i>	<i>SX²</i>	<i>df</i>	RMSEA	<i>p</i>
Acceptance										
MPFI 2	1.14	-2.99	-1.52	-.05	.66	2.07	48.39	13	.06	< .01
MPFI 3	2.49	-1.93	-.85	.14	.73	1.78	13.16	10	.02	.22
MPFI 5	1.07	-2.84	-1.44	-.16	.36	1.33	18.52	12	.03	.10
Present Moment Awareness										
MPFI 7	1.66	-2.89	-1.61	-.18	.50	1.61	14.72	9	.03	.10
MPFI 8	2.32	-3.18	-1.52	-.48	.36	1.24	18.60	9	.04	.03
MPFI 9	2.02	-2.74	-1.32	-.11	.68	1.63	9.58	8	.02	.30
Self as Context										
MPFI 11	1.40	-2.67	-1.83	-.38	.48	1.51	23.19	9	.05	< .01
MPFI 13	1.82	-2.90	-1.74	-.39	.51	1.50	37.32	9	.07	.00
MPFI 15	1.45	-2.46	-1.50	-.22	.78	1.81	10.74	9	.02	.29
Defusion										
MPFI 16	1.39	-2.29	-.91	.30	1.10	2.03	20.48	10	.04	.03
MPFI 19	2.35	-2.08	-.71	.32	.98	2.10	24.82	9	.05	< .01
MPFI 20	1.78	-2.46	-.91	.22	.93	2.01	12.97	9	.03	.16
Values										
MPFI 23	1.77	-3.15	-1.57	-.48	.32	1.14	21.25	8	.05	.01
MPFI 24	2.18	-2.87	-1.76	-.69	.20	1.22	20.20	9	.05	.02
MPFI 25	1.49	-3.46	-1.84	-.56	.23	1.11	47.81	10	.08	< .01
Committed Action										
MPFI 28	1.38	-2.87	-2.18	-.73	.15	1.35	42.73	10	.07	< .01
MPFI 29	2.71	-2.74	-1.50	-.39	.33	1.41	21.90	7	.06	< .01
MPFI 30	1.92	-2.69	-1.51	-.29	.34	1.37	21.58	8	.05	.01
Experiential Avoidance										
MPFI 32	1.61	-2.90	-1.16	-.47	.30	1.61	31.78	10	.06	< .01
MPFI 33	3.20	-2.89	-1.27	-.27	.34	1.43	18.86	8	.05	.02
MPFI 34	1.53	-2.70	-1.26	-.28	.51	1.66	38.50	10	.07	< .01
Lack of Contact with Present Moment Awareness										
MPFI 36	1.05	-2.58	-.74	.43	.87	2.37	35.68	12	.06	< .01
MPFI 38	3.80	-1.37	-.21	.43	1.03	1.97	16.86	9	.04	.05
MPFI 39	2.47	-1.43	-.22	.54	1.10	2.04	26.58	9	.06	< .01
Self as Contents										
MPFI 42	1.13	-1.32	-.59	.56	1.06	1.99	86.20	13	.08	< .01
MPFI 44	4.57	-1.19	-.44	.31	.91	1.59	42.18	8	.08	< .01
MPFI 45	3.54	-1.17	-.46	.32	.93	1.67	36.21	8	.08	< .01
Fusion										
MPFI 47	2.74	-1.40	-.55	.23	.87	1.43	28.72	9	.06	< .01
MPFI 48	3.71	-1.61	-.58	.17	.77	1.55	26.62	8	.06	< .01
MPFI 50	1.52	-1.95	-1.06	.15	.65	1.55	24.06	11	.04	.01
Lack of Contact with Values										
MPFI 52	2.47	-1.19	-.06	.72	1.26	2.00	9.94	9	.01	.36
MPFI 53	3.36	-.71	.26	.85	1.45	2.16	8.48	9	.00	.49
MPFI 55	1.96	-1.21	0	.87	1.20	2.37	19.07	9	.04	.03

Inaction										
MPFI 57	1.81	-1.33	-.21	.63	.93	1.89	15.05	10	.03	.13
MPFI 59	2.94	-1.16	-.06	.68	1.19	2.00	7.63	9	.00	.57
MPFI 60	3.63	-1.24	-.24	.74	1.03	1.55	12.03	8	.03	.15

Note: a , item discrimination parameter; b_1 - b_5 , item threshold parameter

Table 3.3. Correlations among 36-item MPFI-S factors

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 MPFI-S-1 Acceptance	-													
2 MPFI-S-2 Present Awareness	.58**	-												
3 MPFI-S-3 Self as Context	.51**	.52**	-											
4 MPFI-S-4 Defusion	.49**	.43**	.59**	-										
5 MPFI-S-5 Values	.46**	.56**	.59**	.41**	-									
6 MPFI-S-6 Committed Action	.40**	.48**	.55**	.48**	.70**	-								
7 MPFI-S-7 Experiential Avoidance	-.09*	-.02	.09*	-.01	.10**	.15**	-							
8 MPFI-S-8 Lack of Awareness	-.20**	-.19**	-.18**	-.13**	-.21**	-.18**	.19**	-						
9 MPFI-S-9 Self as Contents	-.12**	-.18**	-.22**	-.31**	-.21**	-.24**	.24**	.43**	-					
10 MPFI-S-10 Fusion	-.15**	-.13**	-.24**	-.45**	-.16**	-.24**	.25**	.41**	.66**	-				
11 MPFI-S-11 Lack of Values	-.14**	-.19**	-.26**	-.19**	-.39**	-.38**	.11**	.43**	.52**	.50**	-			
12 MPFI-S-12 Inaction	-.17**	-.17**	-.31**	-.40**	-.34**	-.41**	.15**	.39**	.59**	.68**	.72**	-		
13 MPFI-S-PF Flexibility	.75**	.77**	.81**	.74**	.80**	.78**	.05	-.24**	-.28**	-.30**	-.33**	-.39**	-	
14 MPFI-S-PI Inflexibility	-.20**	-.21**	-.27**	-.36**	-.28**	-.31**	.43**	.65**	.81**	.82**	.76**	.83**	-.35**	-

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

Table 3.4. Correlations between MPFI-S factors and related constructs

Variables	PPFI-av	PPFI-ac	PPFI-ha	PPFI	Psy-Flex	DTS-tl	DTS-ap	DTS-ab	DTS-re	DTS	DASS-d	DASS-a	DASS-s	DASS
1 MPFI-S-1 Acceptance	.19**	.38**	.08	.31**	.44**	.19**	.27**	.20**	.10*	.25**	-.18**	-.17**	-.16**	-.19**
2 MPFI-S-2 Present Awareness	.26**	.33**	.05	.32**	.41**	.12**	.19**	.10*	.09*	.17**	-.23**	-.12**	-.15**	-.19**
3 MPFI-S-3 Self as Context	.26**	.42**	.16**	.41**	.51**	.25**	.31**	.29**	.05	.29**	-.26**	-.12**	-.24**	-.23**
4 MPFI-S-4 Defusion	.27**	.29**	.15**	.35**	.55**	.33**	.43**	.46**	.13**	.43**	-.30**	-.24**	-.33**	-.32**
5 MPFI-S-5 Values	.38**	.39**	.11*	.44**	.48**	.16**	.23**	.17**	.03	.19**	-.32**	-.17**	-.20**	-.25**
6 MPFI-S-6 Committed Action	.41**	.37**	.13**	.47**	.51**	.22**	.28**	.26**	.05	.26**	-.37**	-.21**	-.26**	-.31**
7 MPFI-S-7 Experiential Avoidance	-.05	.05	.05	.02	0	-.22**	-.18**	-.14**	-.29**	-.24**	.07	.09*	.11**	.10*
8 MPFI-S-8 Lack of Awareness	-.29**	-.17**	.01	-.24**	-.22**	-.22**	-.30**	-.25**	-.14**	-.28**	.41**	.33**	.34**	.39**
9 MPFI-S-9 Self as Contents	-.31**	-.15**	.10*	-.20**	-.32**	-.32**	-.50**	-.38**	-.20**	-.45**	.49**	.39**	.45**	.49**
10 MPFI-S-10 Fusion	-.36**	-.11*	.11*	-.21**	-.36**	-.43**	-.54**	-.55**	-.26**	-.56**	.52**	.46**	.55**	.56**
11 MPFI-S-11 Lack of Values	-.44**	-.24**	.12**	-.30**	-.35**	-.28**	-.39**	-.30**	-.14**	-.36**	.52**	.40**	.43**	.50**
12 MPFI-S-12 Inaction	-.49**	-.22**	.08	-.35**	-.47**	-.40**	-.52**	-.47**	-.24**	-.51**	.61**	.49**	.56**	.61**
13 MPFI-S-PF Flexibility	.38**	.47**	.14**	.49**	.63**	.28**	.37**	.32**	.10*	.34**	-.36**	-.22**	-.29**	-.32**
14 MPFI-S-PI Inflexibility	-.44**	-.19**	.11**	-.30**	-.40**	-.43**	-.57**	-.49**	-.29**	-.56**	.62**	.51**	.57**	.62**

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

(Continued)

	Variables	QUEST-di	QUEST-ob	QUEST-tr	QUEST	CFQ	ELS-vl	ELS-lf	ELS	BFI-neu	PANAS-ne
1	MPFI-S-1 Acceptance	.41**	.29**	.20**	.38**	-.18**	.28**	.24**	.29**	-.25**	-.16**
2	MPFI-S-2 Present Awareness	.39**	.40**	.29**	.46**	-.13**	.36**	.34**	.39**	-.19**	-.12**
3	MPFI-S-3 Self as Context	.55**	.46**	.32**	.55**	-.26**	.37**	.37**	.40**	-.36**	-.17**
4	MPFI-S-4 Defusion	.64**	.30**	.16**	.45**	-.43**	.36**	.39**	.41**	-.54**	-.29**
5	MPFI-S-5 Values	.36**	.45**	.22**	.43**	-.23**	.51**	.44**	.53**	-.27**	-.19**
6	MPFI-S-6 Committed Action	.43**	.45**	.22**	.45**	-.28**	.51**	.46**	.54**	-.32**	-.24**
7	MPFI-S-7 Experiential Avoidance	-.02	.07	.04	.04	.14**	.11*	.01	.07	.14**	.11**
8	MPFI-S-8 Lack of Awareness	-.11*	-.11*	0	-.09*	.33**	-.20**	-.18**	-.21**	.22**	.27**
9	MPFI-S-9 Self as Contents	-.28**	-.16**	0	-.19**	.55**	-.21**	-.28**	-.26**	.47**	.44**
10	MPFI-S-10 Fusion	-.33**	-.11**	.03	-.17**	.71**	-.20**	-.26**	-.25**	.56**	.54**
11	MPFI-S-11 Lack of Values	-.17**	-.20**	0	-.16**	.45**	-.27**	-.29**	-.31**	.34**	.41**
12	MPFI-S-12 Inaction	-.31**	-.22**	.02	-.21**	.64**	-.33**	-.37**	-.38**	.54**	.53**
13	MPFI-S-PF Flexibility	.60**	.51**	.31**	.59**	-.33**	.52**	.48**	.55**	-.41**	-.25**
14	MPFI-S-PI Inflexibility	-.29**	-.17**	.02	-.18**	.66**	-.26**	-.32**	-.32**	.53**	.54**

Note: PPFi, Personalized Psychological Flexibility Index; PPFi-av, Avoidance; PPFi-ac, Acceptance; PPFi-ha, Harnessing; DTS, Distress Tolerance Scale; DTS-tl, Tolerance; DTS-ap, Appraisal; DTS-ab, Absorption; DTS-re, Regulation; DASS, Depression Anxiety Stress Scales; DASS-d, Depression; DASS-a, Anxiety; DASS-s, Stress; QUEST, Questionnaire on Self-Transcendence; QUEST-di, Distancing; QUEST-ob, Observing Self; QUEST-tr, Inter-Transcendence; CFQ, Cognitive Fusion Questionnaire; ELS, Engaged Living Scale; ELS-vl, Valued Living; ELS-lf, Life Fulfillment; BFI-neu, Big Five Inventory - Neuroticism; PANAS-ne, Positive and Negative Affect Schedule - Negative Affect

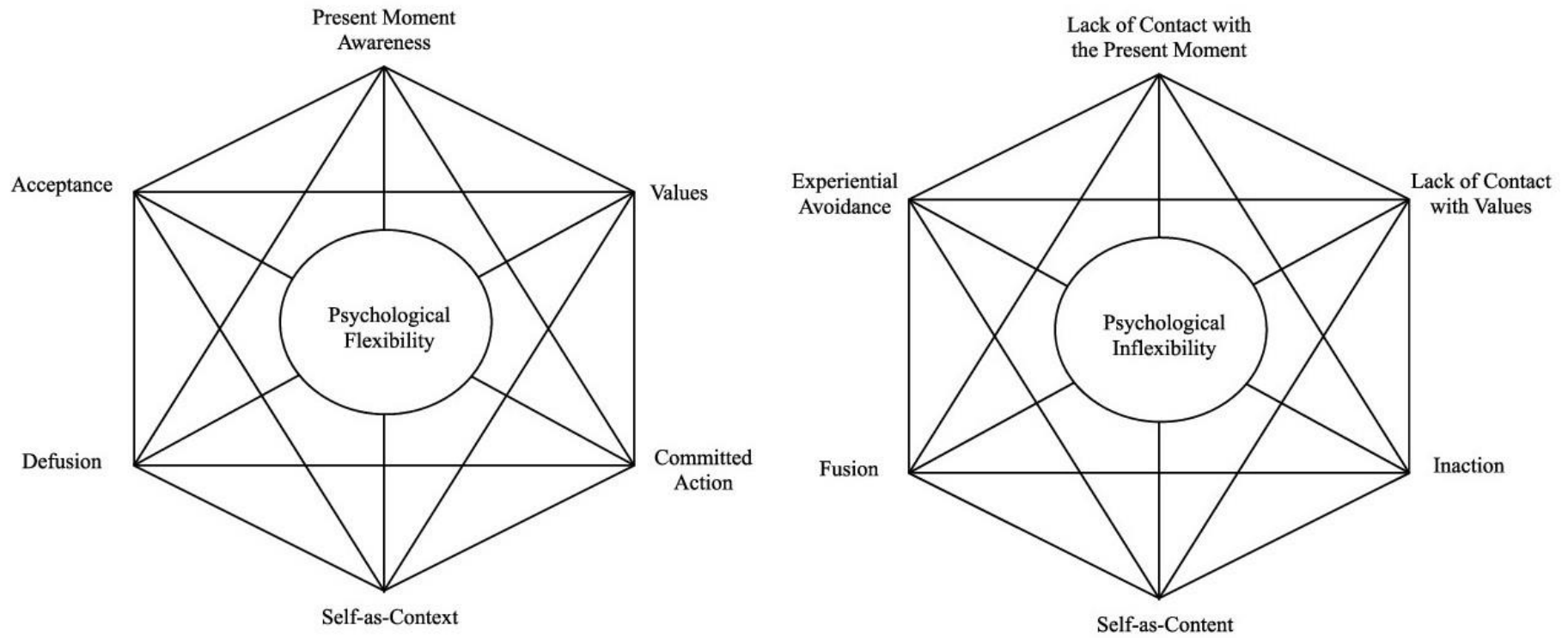


Figure 1.1. Conceptual representation of the model

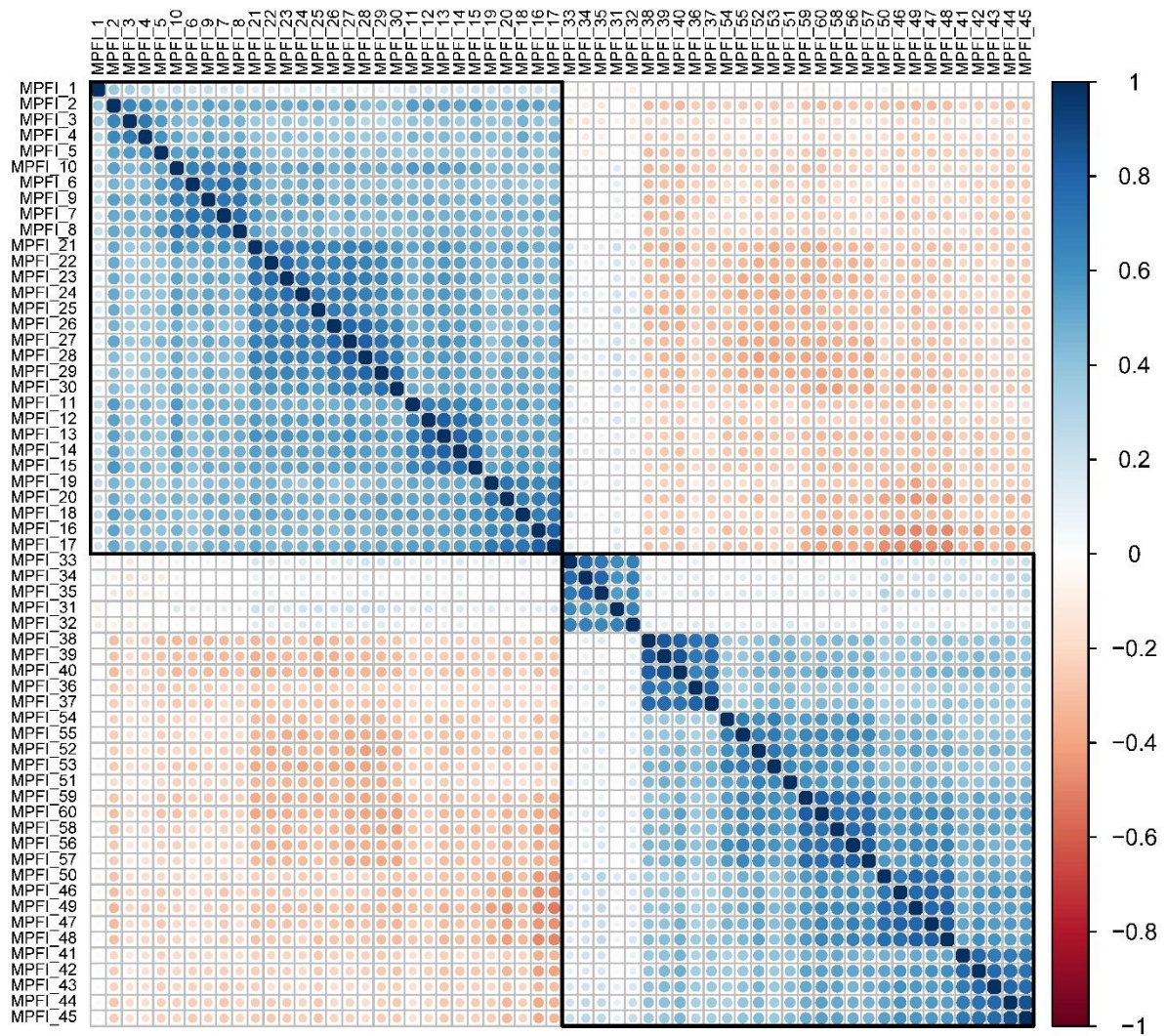
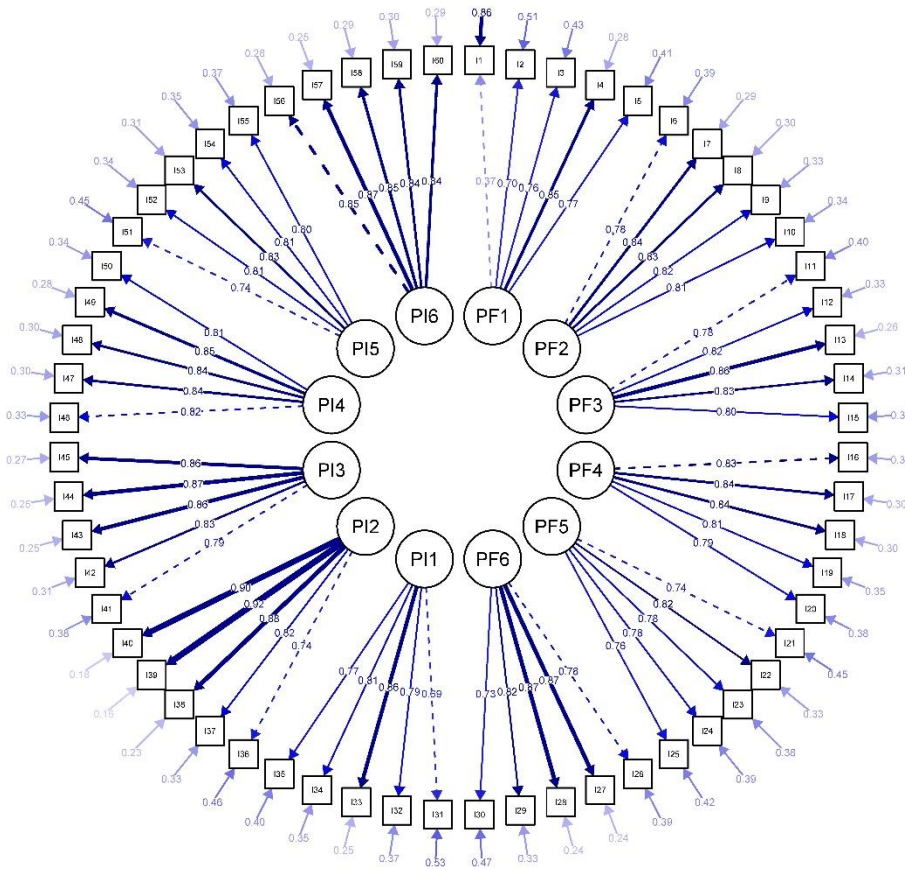
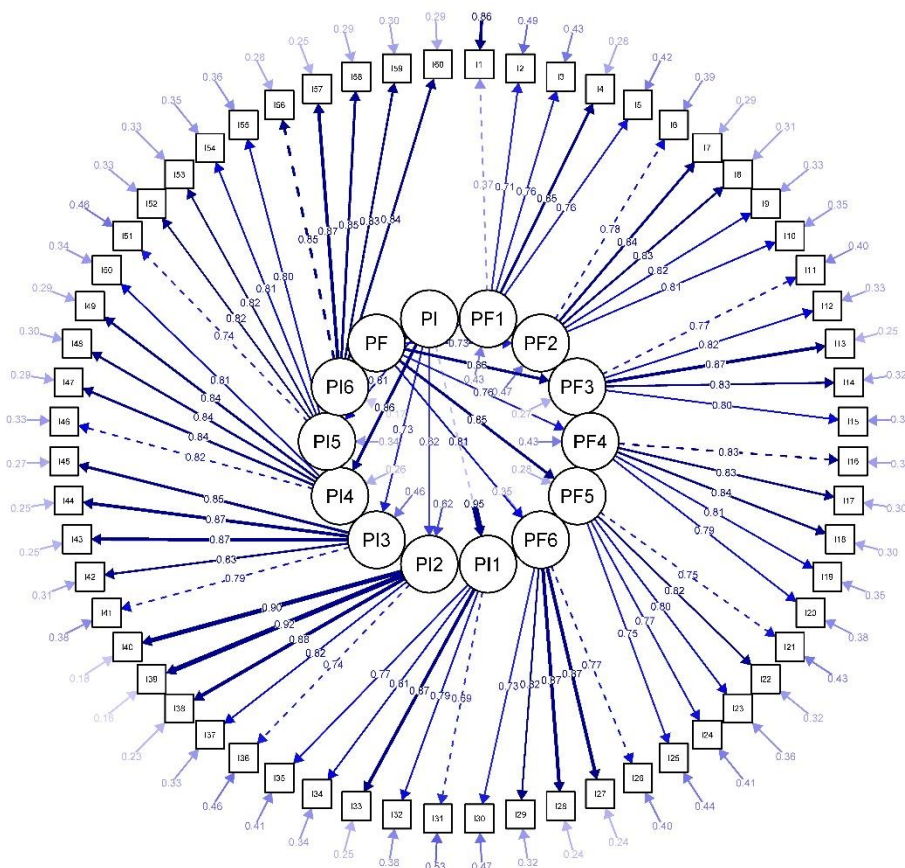


Figure 2.1. Interitem correlation of 60-item in MPFI



Note. PF1, Acceptance; PF2, Present Moment Awareness; PF3, Self as Context; PF4, Defusion; PF5, Value; PF6, Committed Action; PI1, Experiential Avoidance; PI2, Lack of Contact with Present Moment Awareness; PI3, Self as Contents; PI4, Fusion; PI5, Lack of Contact with Values; PI6, Inaction

Figure 2.2. Confirmatory Factor Analysis for 12-factor model



Note. PF, Psychological Flexibility; PI, Psychological Inflexibility; PF1, Acceptance; PF2, Present Moment Awareness; PF3, Self as Context; PF4, Defusion; PF5, Value; PF6, Committed Action; PI1, Experiential Avoidance; PI2, Lack of Contact with Present Moment Awareness; PI3, Self as Contents; PI4, Fusion; PI5, Lack of Contact with Values; PI6, Inaction

Figure 2.3. Confirmatory Factor Analysis for 12-factor model with two second-order factors

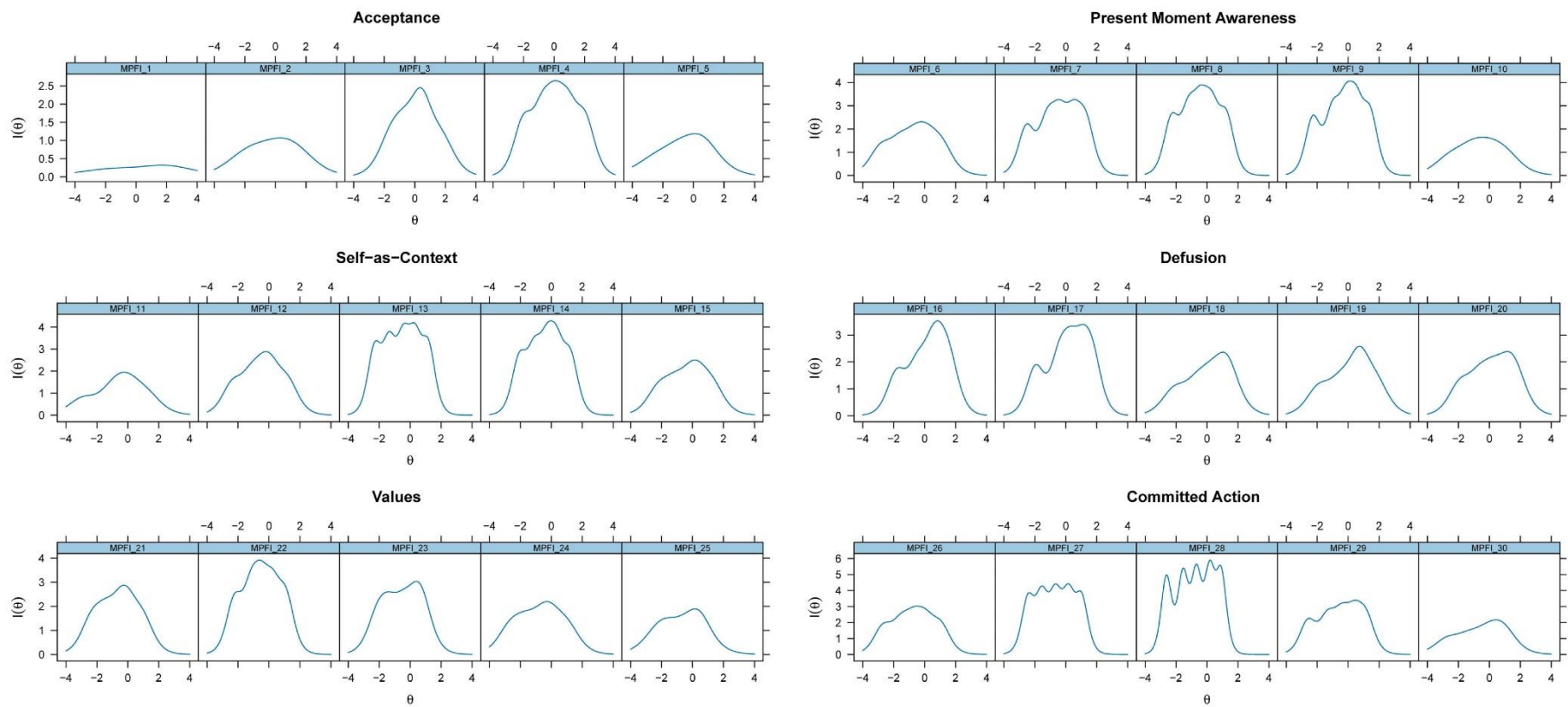


Figure 2.4. Item information curve of each factor in psychological flexibility

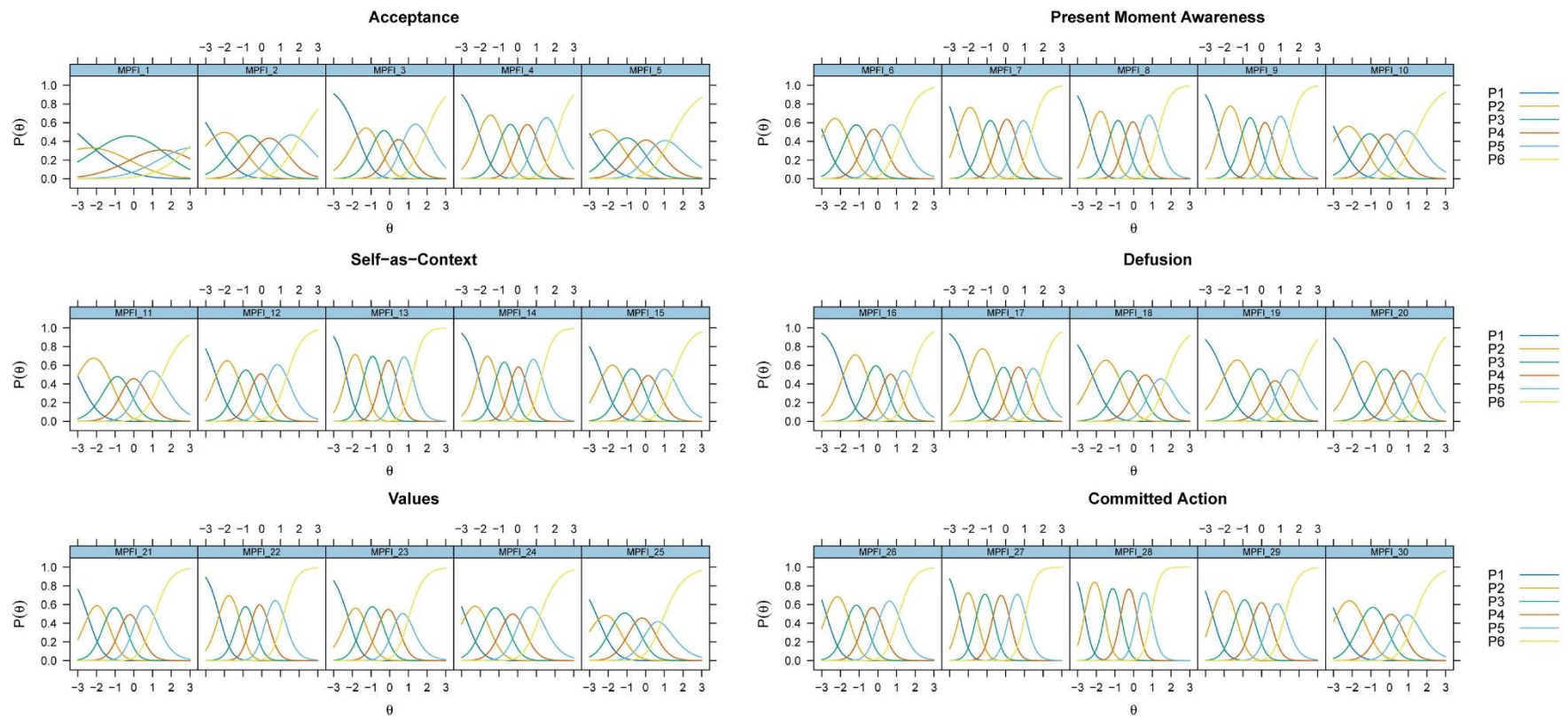


Figure 2.5. Item category characteristics curves of each factor in psychological flexibility

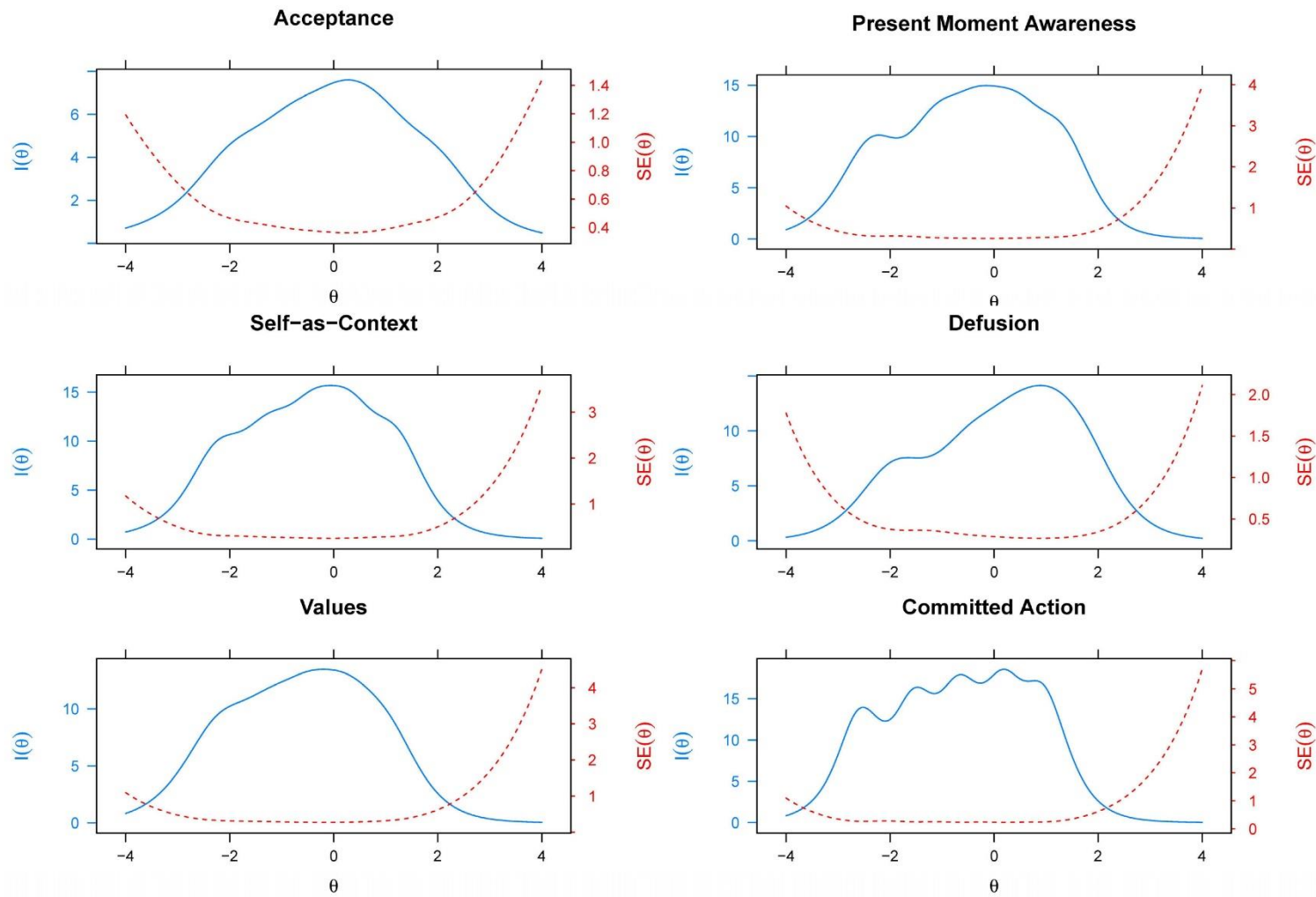


Figure 2.6. Test information curves of each factor in psychological flexibility

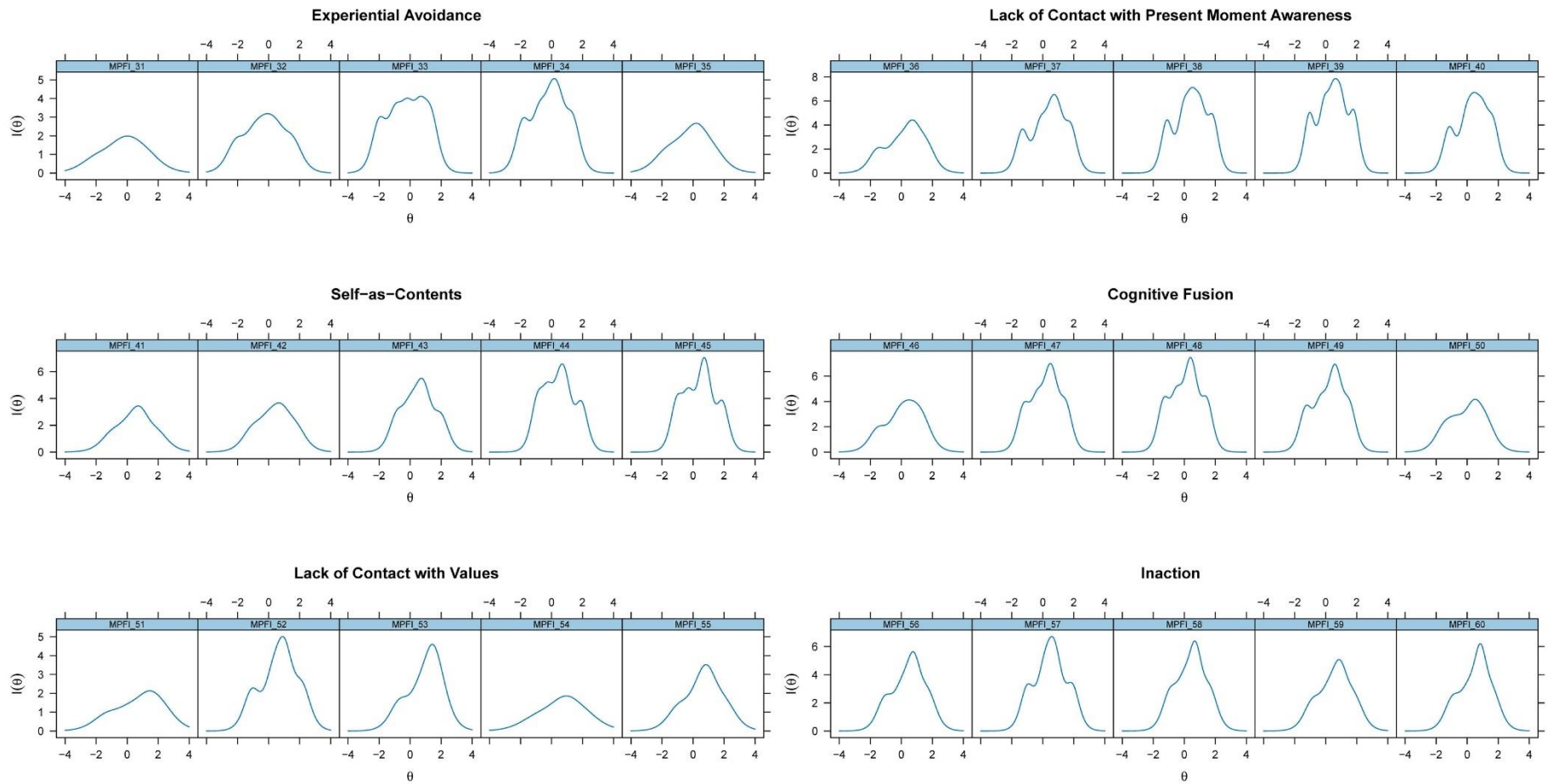


Figure 2.7. Item information curves of each factor in psychological inflexibility

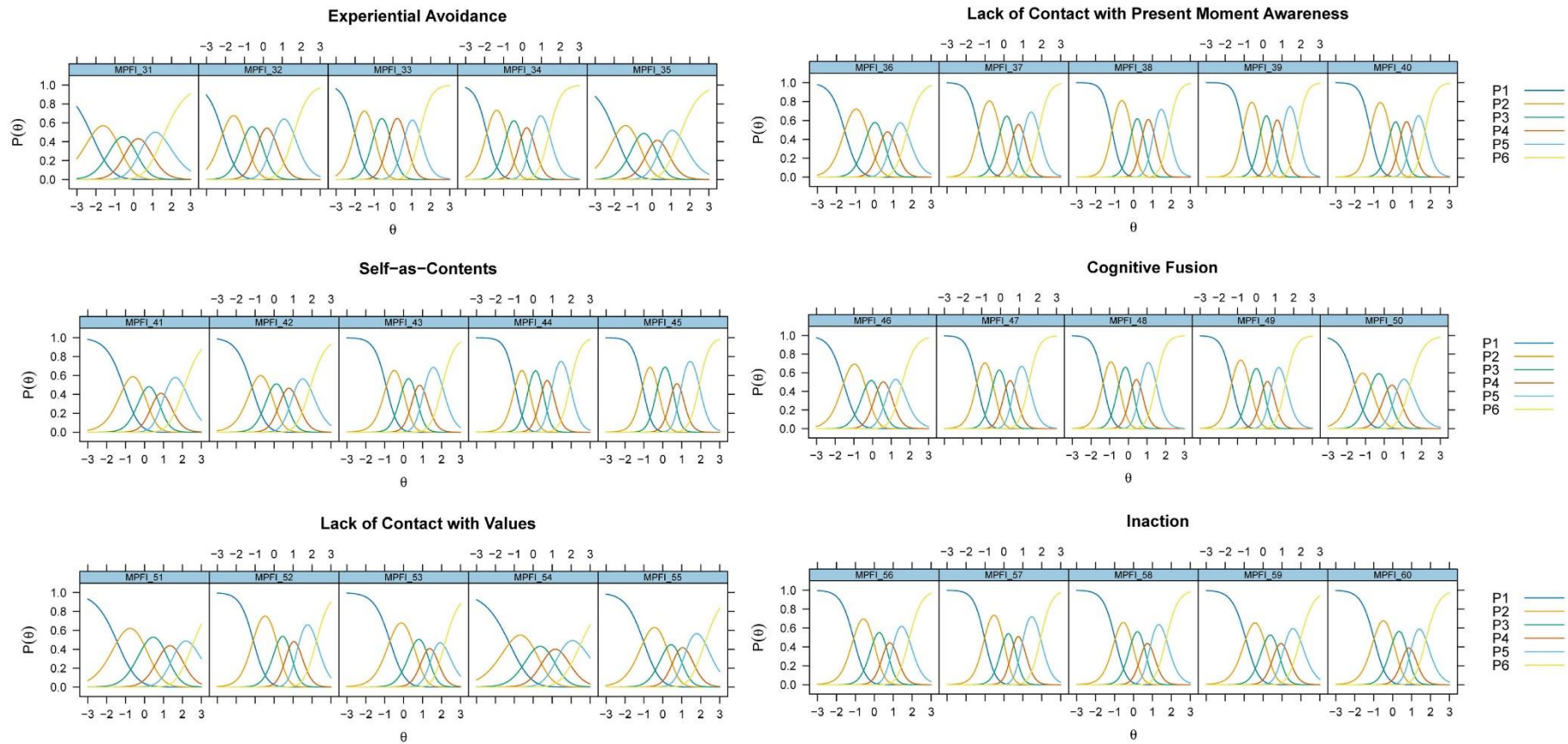


Figure 2.8. Item category characteristics curves of each factor in psychological inflexibility

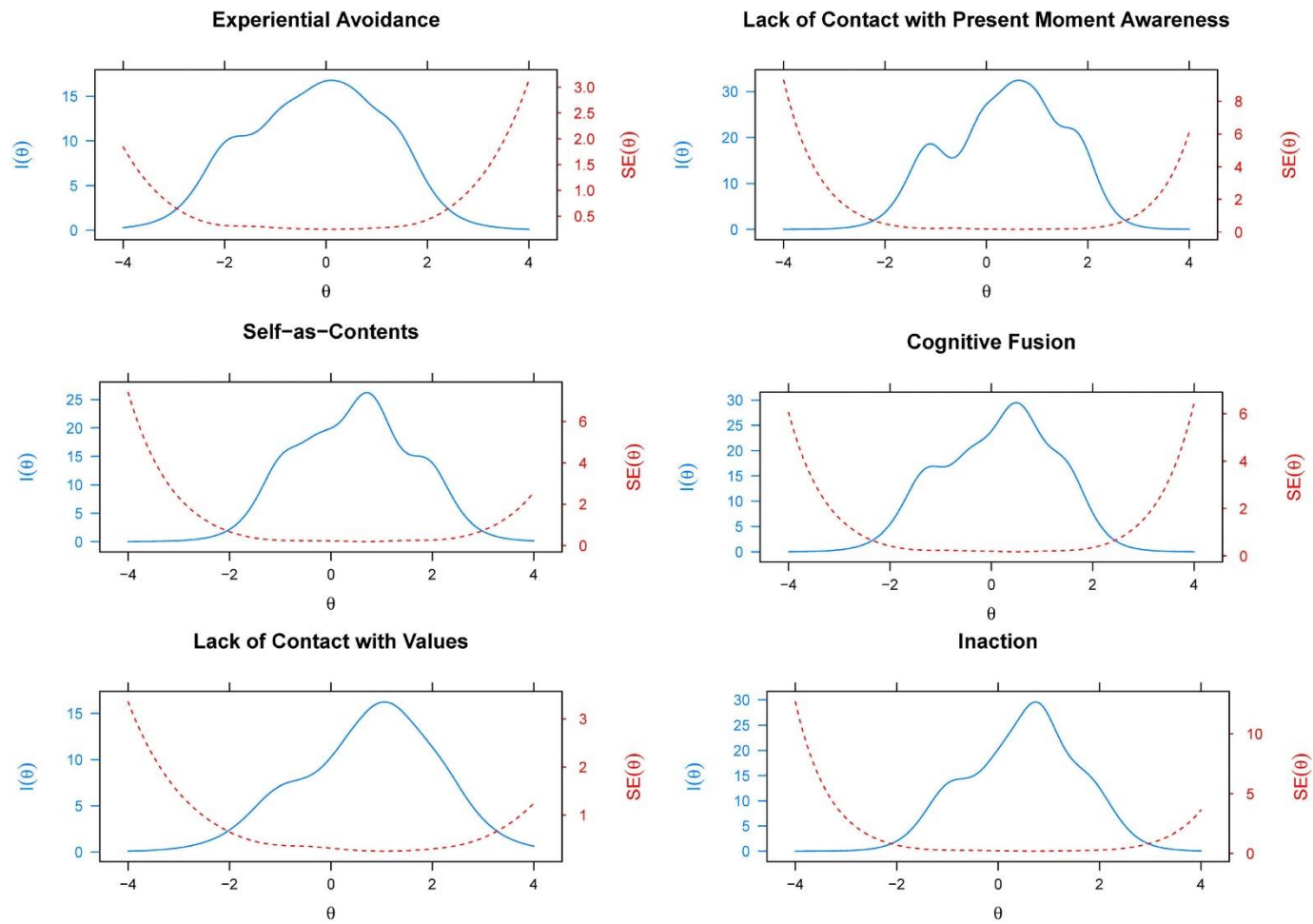
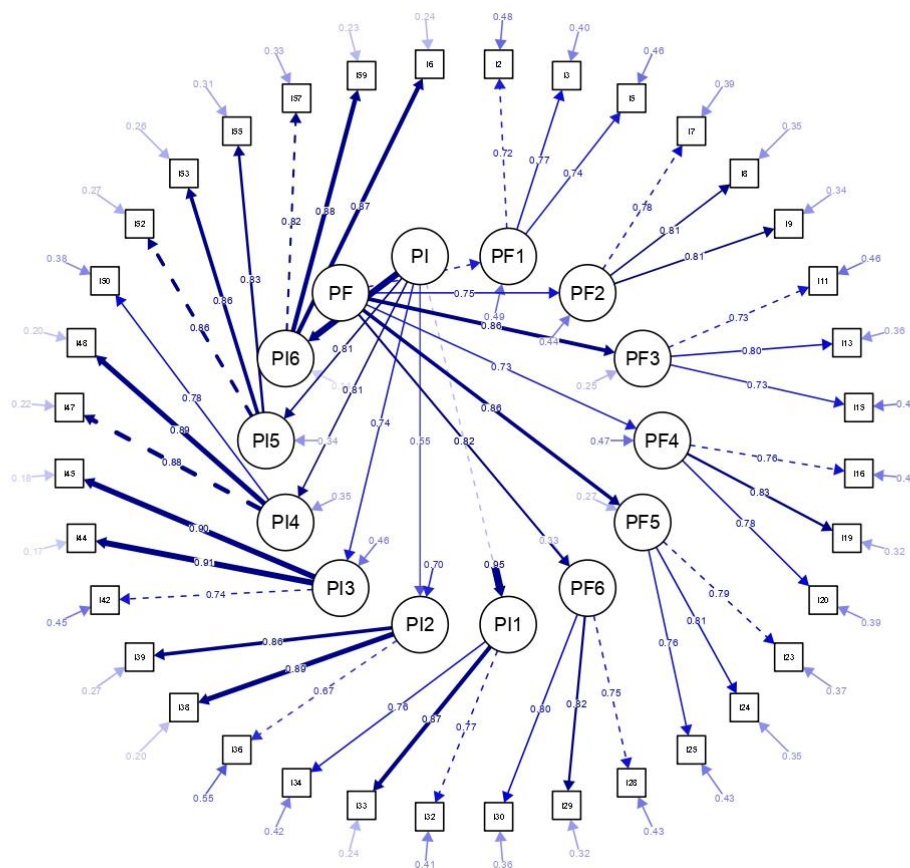


Figure 2.9. Test information curves of each factor in psychological inflexibility



Note. PF, Psychological Flexibility; PI, Psychological Inflexibility; PF1, Acceptance; PF2, Present Moment Awareness; PF3, Self as Context; PF4, Defusion; PF5, Value; PF6, Committed Action; PI1, Experiential Avoidance; PI2, Lack of Contact with Present Moment Awareness; PI3, Self as Contents; PI4, Fusion; PI5, Lack of Contact with Values; PI6, Inaction

Figure 3.1. Confirmatory factor analysis of MPFI-S

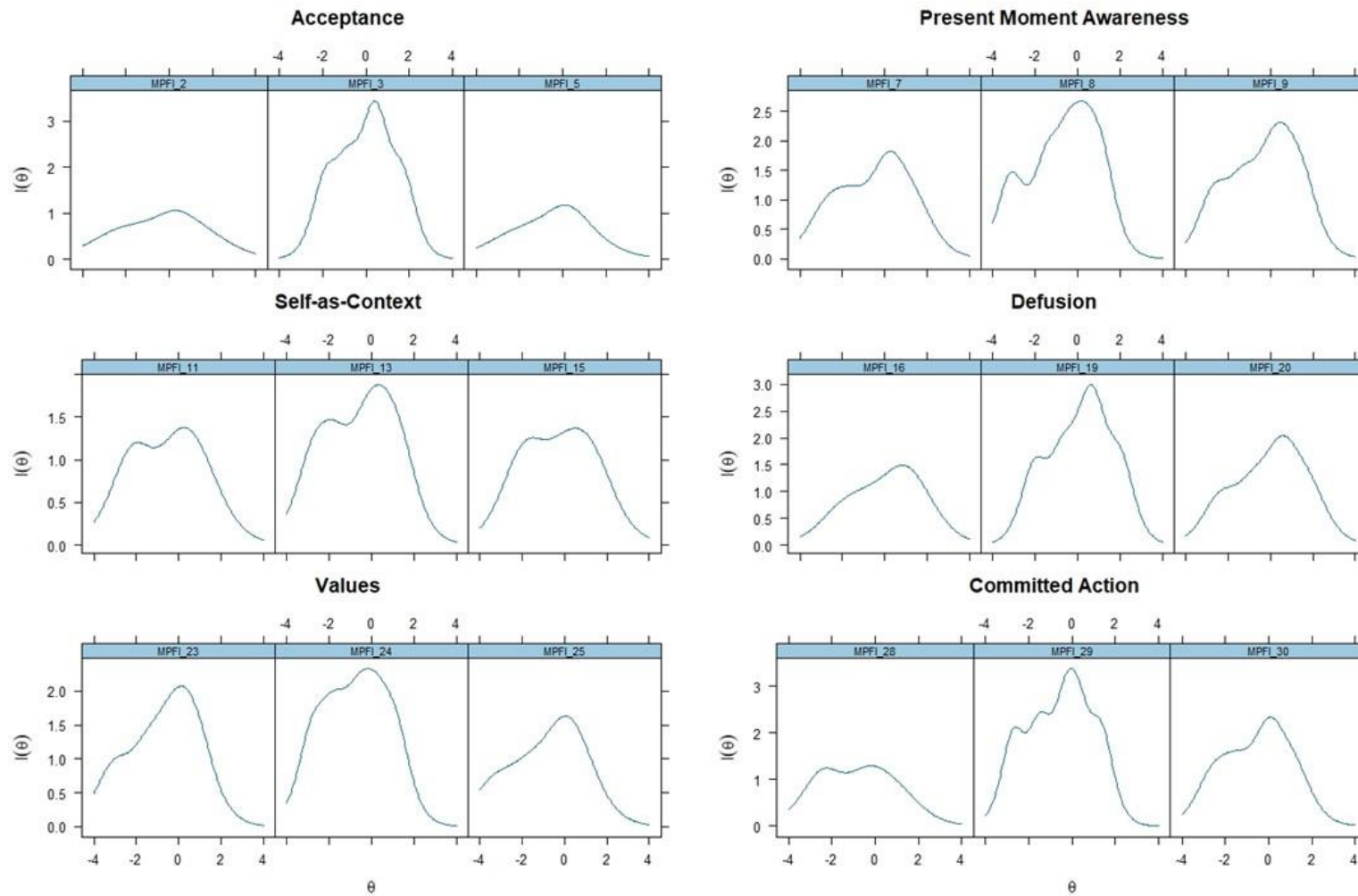


Figure 3.2. Item information curve of psychological flexibility in MPFI-S

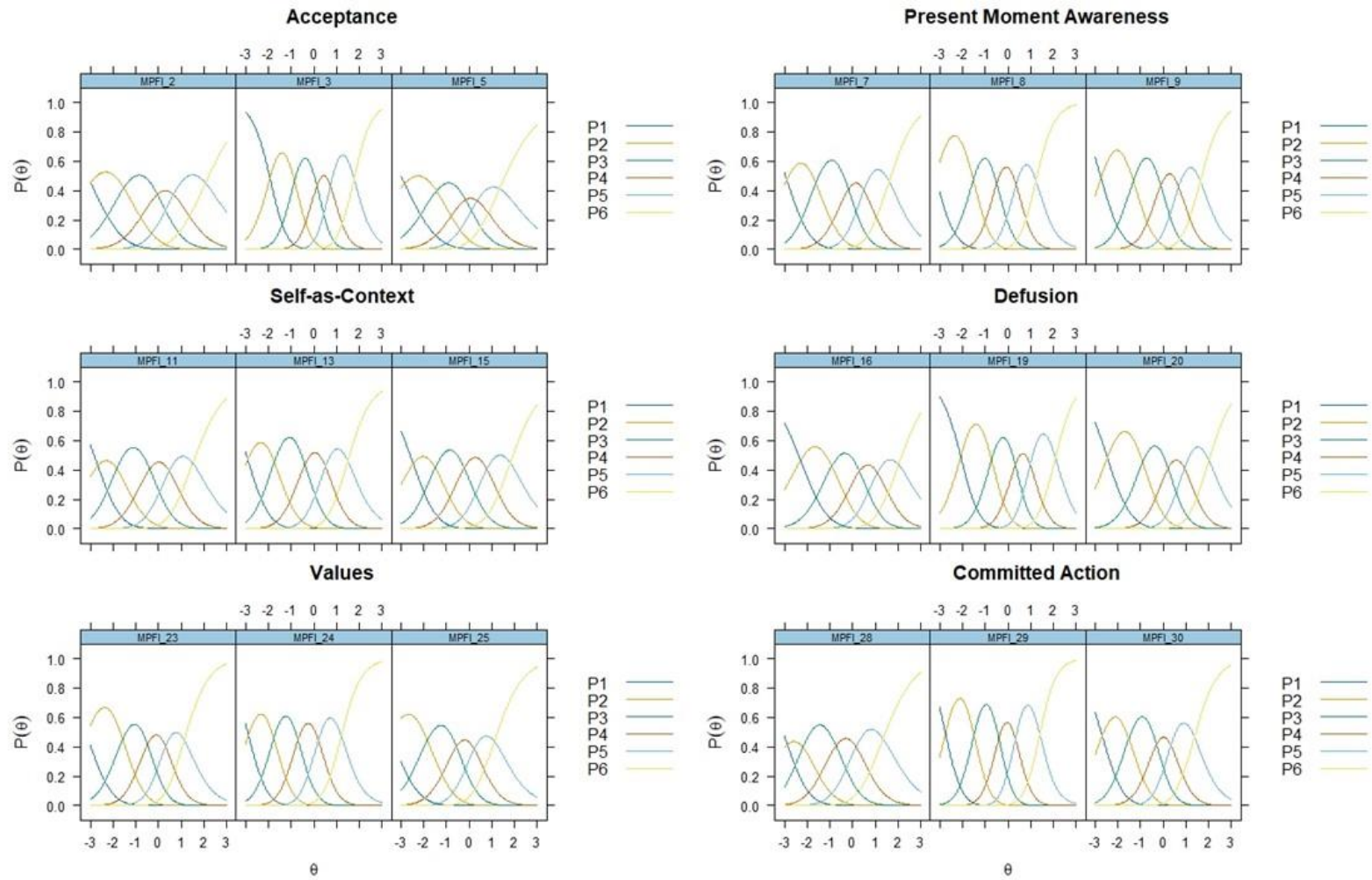


Figure 3.3. Item category characteristics curves of psychological flexibility in MPFI-S

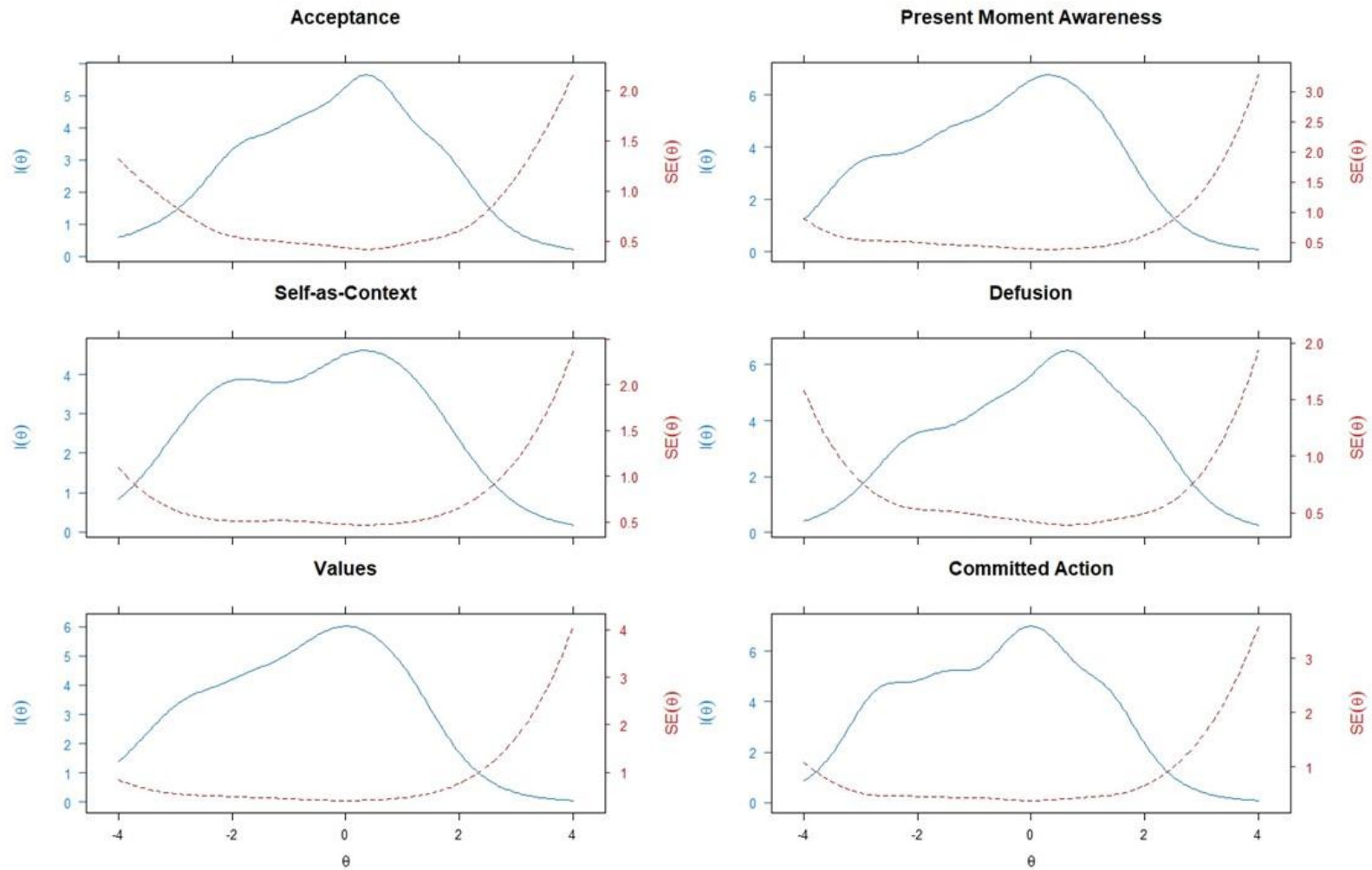


Figure 3.4. Test information curves of psychological flexibility in MPFI-S

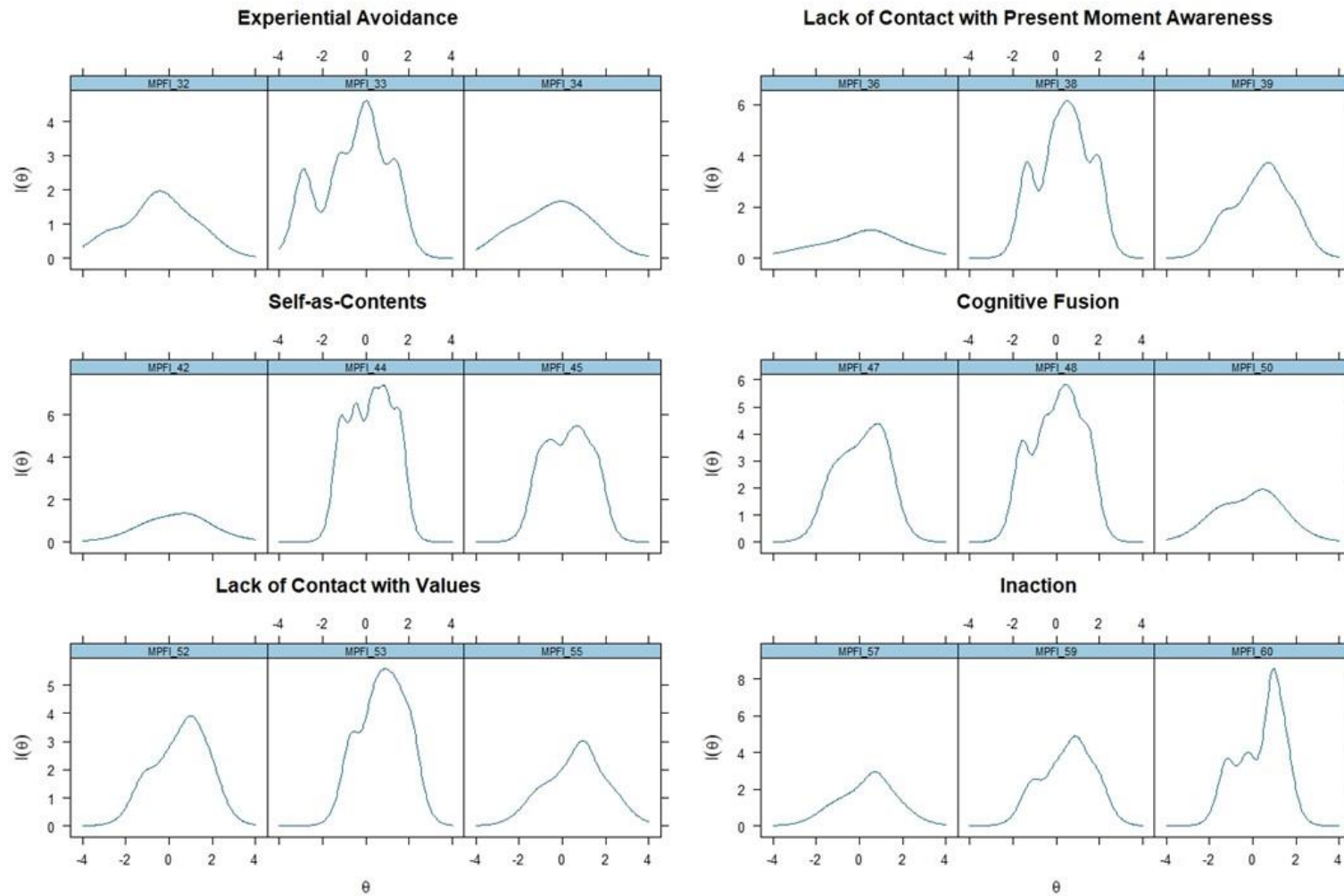


Figure 3.5. Item information curve of psychological inflexibility in MPFI-S

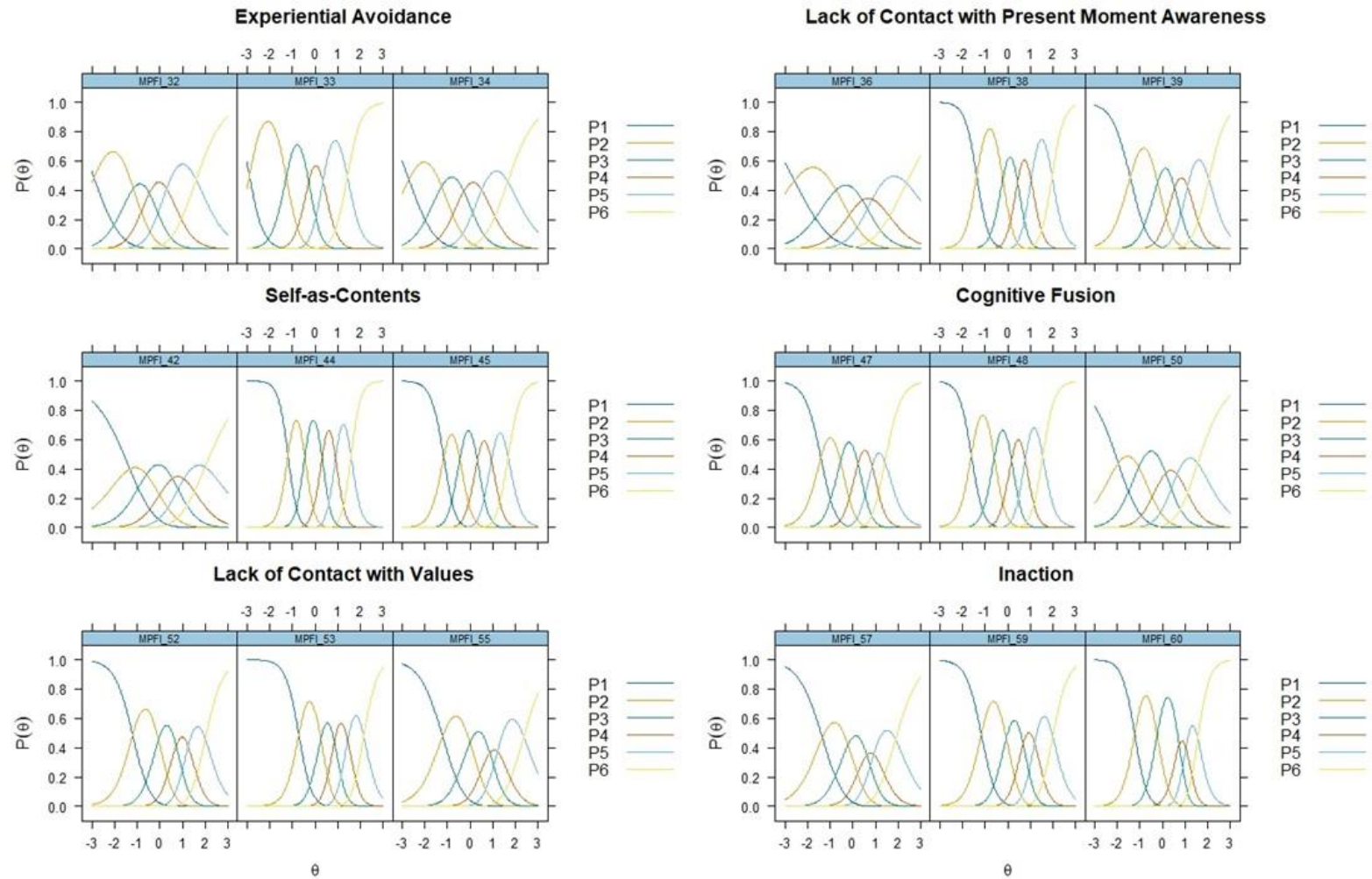


Figure 3.6. Item category characteristics curves of psychological inflexibility in MPFI-S

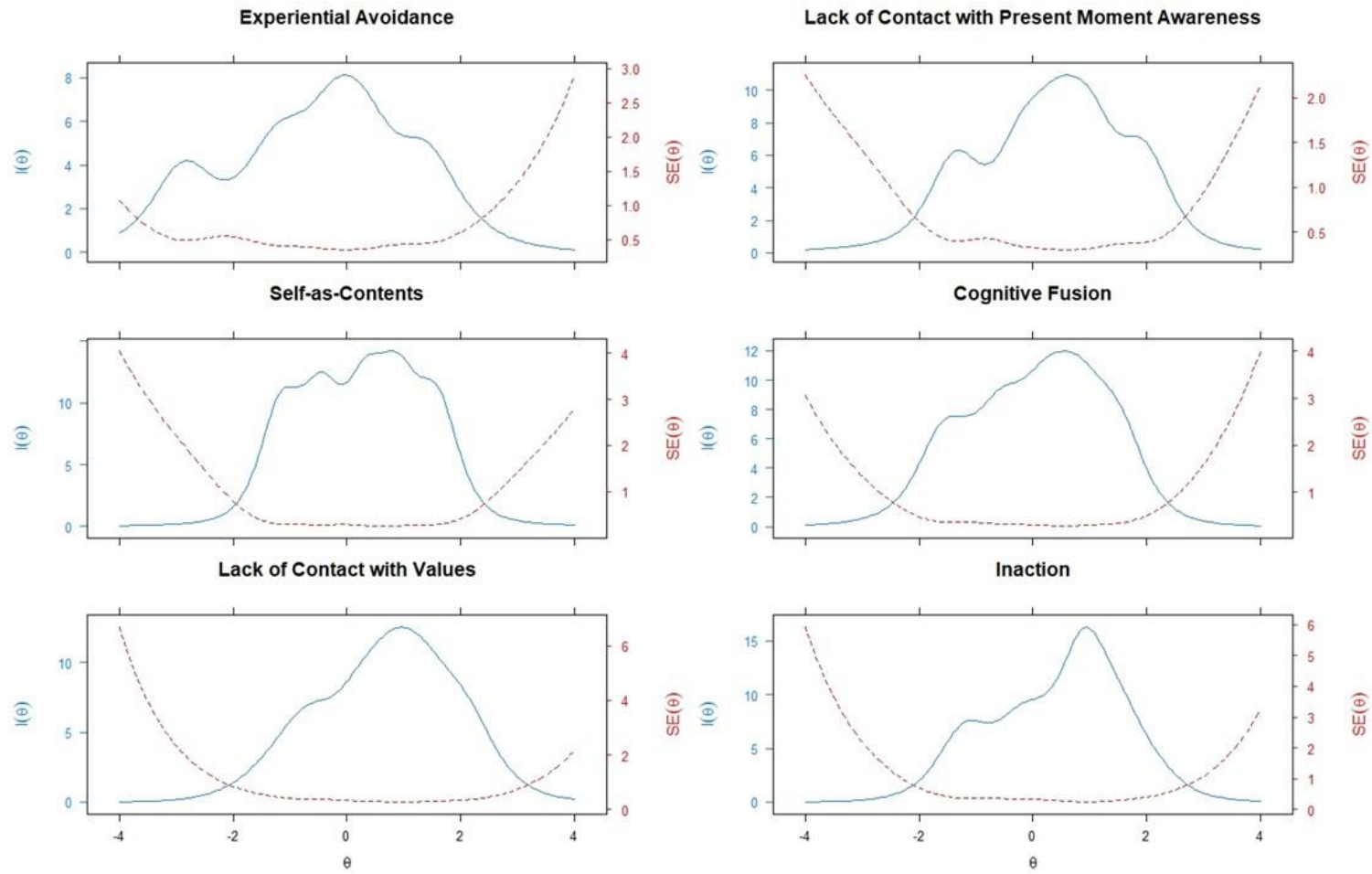


Figure 3.7. Test information curves of psychological inflexibility in MPFI-S

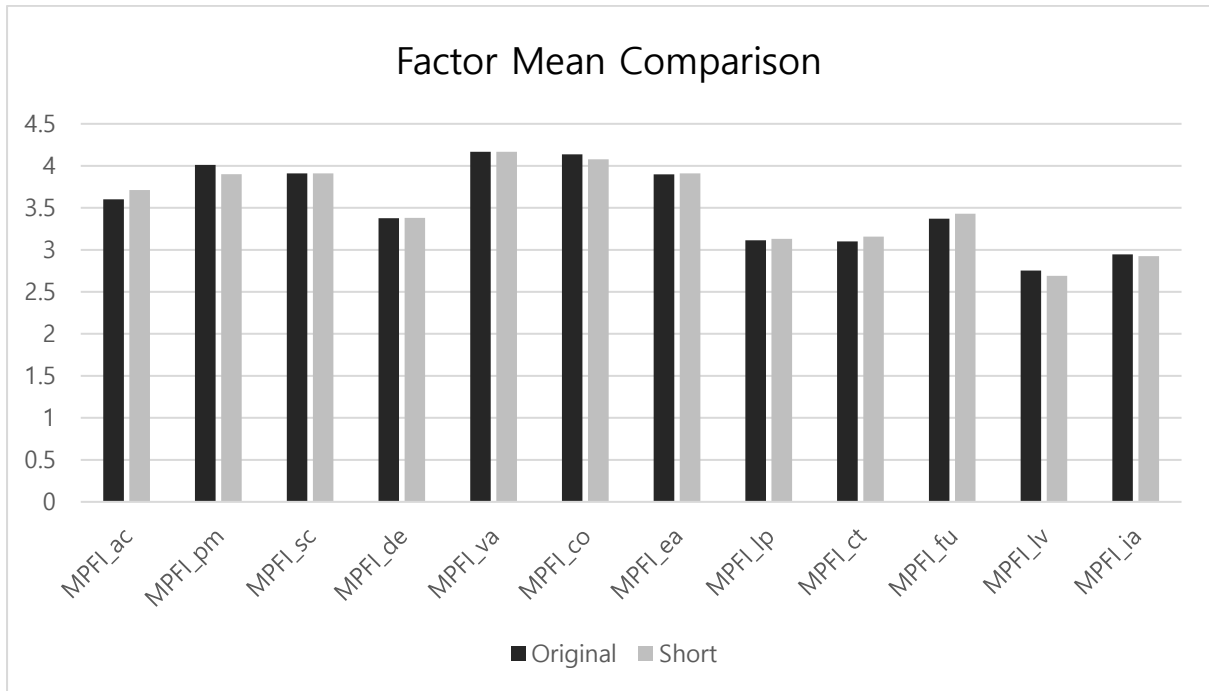


Figure 3.8. Factor mean comparisons between original 60-item MPFI and 36-item MPFI-S

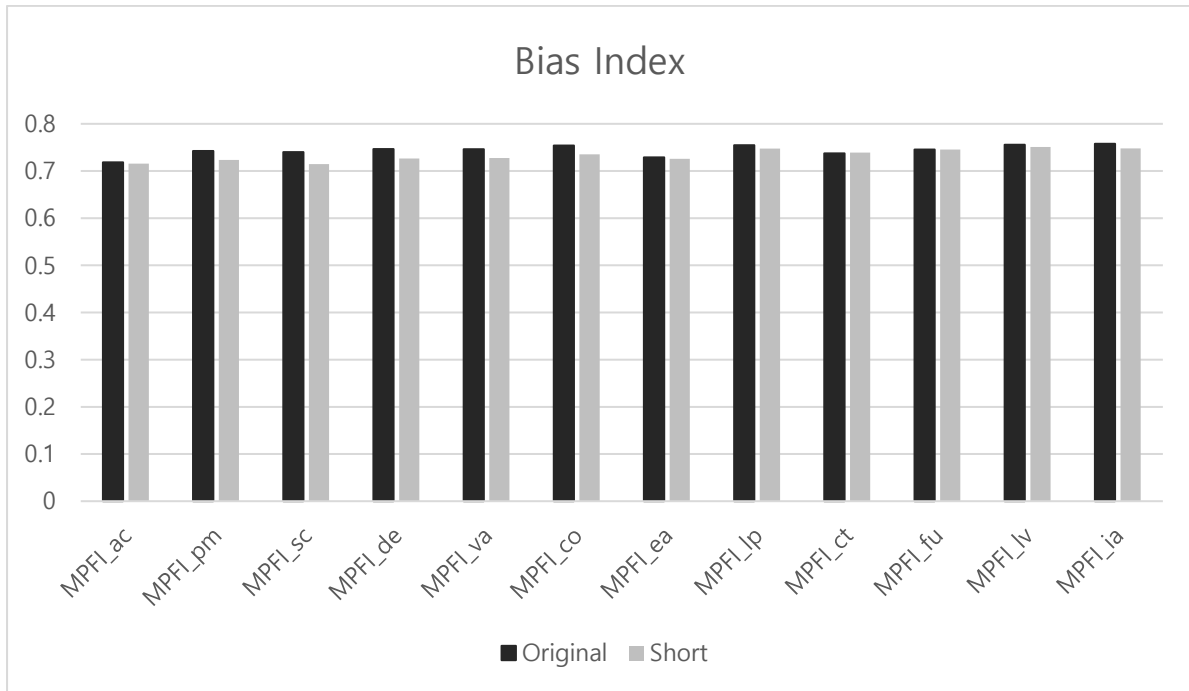


Figure 3.9. Bias index with absolute theta mean of the original 60-item MPFI and 36-item MPFI-S

Appendix A. Demographic Survey

Instruction: Please respond to the following items.

1. How old are you (years)?
2. What is your gender?
 - ① Male ② Female ③ Other (please specify)
3. What is your sexual orientation?
 - ① Heterosexual ② Homosexual ③ Bisexual ④ Other (please specify)
4. What is your ethnicity?
 - ① Native American ② Latinx ③ Asian ④ Pacific Islander ⑤ White ⑥ Black
 - ⑦ Hawaiian ⑧ Other (please specify) ⑨ Biracial/Multicultural (i.e., multiracial)
5. Have you ever sought a professional psychological service (e.g., a service from a psychiatrist, psychologist, counselor, and other psychological professional) for a personal problem?
 - ① Yes (please specify) ② No
6. How would you describe your family's financial situation as you were growing up?
 - ① Poor class ② Working class ③ Middle class ④ Upper middle class ⑤ Upper class
7. What is your weight?
8. What is your height?

Appendix B. The Multidimensional Psychological Flexibility Inventory

Reference: Rolffs, J. L., Rogge, R. D., & Wilson, K. G. (2018). Disentangling components of flexibility via the hexaflex model: Development and validation of the Multidimensional Psychological Flexibility Inventory (MPFI). *Assessment*, 25(4), 458-482.

Instruction: Please provide your response to the following items based on your experience over the past two weeks.

Scale: ① Never True, ② Rarely True, ③ Occasionally True, ④ Often True, ⑤ Very Often True, ⑥ Always True

1. I was receptive to observing unpleasant thoughts and feelings without interfering with them.
2. I tried to make peace with my negative thoughts and feelings rather than resisting them.
3. I made room to fully experience negative thoughts and emotions, breathing them in rather than pushing them away.
4. When I had an upsetting thought or emotion, I tried to give it space rather than ignoring it.
5. I opened myself to all of my feelings, the good and the bad.
6. I was attentive and aware of my emotions.
7. I was in tune with my thoughts and feelings from moment to moment.
8. I paid close attention to what I was thinking and feeling.
9. I was in touch with the ebb and flow of my thoughts and feelings.
10. I strived to remain mindful and aware of my own thoughts and emotions.
11. Even when I felt hurt or upset, I tried to maintain a broader perspective.
12. I carried myself through tough moments by seeing my life from a larger viewpoint.
13. I tried to keep perspective even when life knocked me down.
14. When I was scared or afraid, I still tried to see the larger picture.
15. When something painful happened, I tried to take a balanced view of the situation.
16. I was able to let negative feelings come and go without getting caught up in them.
17. When I was upset, I was able to let those negative feelings pass through me without clinging to them.
18. When I was scared or afraid, I was able to gently experience those feelings, allowing them to pass.
19. I was able to step back and notice negative thoughts and feelings without reacting to them.
20. In tough situations, I was able to notice my thoughts and feelings without getting overwhelmed by them.
21. I was very in-touch with what is important to me and my life.
22. I stuck to my deeper priorities in life.
23. I tried to connect with what is truly important to me on a daily basis.
24. Even when it meant making tough choices, I still tried to prioritize the things that were important to me.
25. My deeper values consistently gave direction to my life.
26. Even when I stumbled in my efforts, I didn't quit working toward what is important.
27. Even when times got tough, I was still able to take steps toward what I value in life.
28. Even when life got stressful and hectic, I still worked toward things that were important to me.
29. I didn't let set-backs slow me down in taking action toward what I really want in life.
30. I didn't let my own fears and doubts get in the way of taking action toward my goals.
31. When I had a bad memory, I tried to distract myself to make it go away.

32. I tried to distract myself when I felt unpleasant emotions.
33. When unpleasant memories came to me, I tried to put them out of my mind.
34. When something upsetting came up, I tried very hard to stop thinking about it.
35. If there was something I didn't want to think about, I would try many things to get it out of my mind.
36. I did most things on "automatic" with little awareness of what I was doing.
37. I did most things mindlessly without paying much attention.
38. I went through most days on auto-pilot without paying much attention to what I was thinking or feeling.
39. I floated through most days without paying much attention.
40. Most of the time I was just going through the motions without paying much attention.
41. I thought some of my emotions were bad or inappropriate and I shouldn't feel them.
42. I criticized myself for having irrational or inappropriate emotions.
43. I believed some of my thoughts are abnormal or bad and I shouldn't think that way.
44. I told myself that I shouldn't be feeling the way I'm feeling.
45. I told myself I shouldn't be thinking the way I was thinking.
46. Negative thoughts and feelings tended to stick with me for a long time.
47. Distressing thoughts tended to spin around in my mind like a broken record.
48. It was very easy to get trapped into unwanted thoughts and feelings.
49. When I had negative thoughts or feelings it was very hard to see past them.
50. When something bad happened it was hard for me to stop thinking about it.
51. My priorities and values often fell by the wayside in my day to day life.
52. When life got hectic, I often lost touch with the things I value.
53. The things that I value the most often fell off my priority list completely.
54. I didn't usually have time to focus on the things that are really important to me.
55. When times got tough, it was easy to forget about what I truly value.
56. Negative feelings often trapped me in inaction.
57. Negative feelings easily stalled out my plans.
58. Getting upset left me stuck and inactive.
59. Negative experiences derailed me from what's really important.
60. Unpleasant thoughts and feelings easily overwhelmed my efforts to deepen my life.

Appendix C. The Psy-Flex

Reference: Gloster, A. T., Block, V. J., Klotsche, J., Villanueva, J., Rinner, M. T., Benoy, C., ... & Bader, K. (2021). Psy-Flex: A contextually sensitive measure of psychological flexibility. *Journal of Contextual Behavioral Science*, 22, 13-23.

Instruction: Please provide your response to the following items based on your experience over the last seven days.

Scale: ① Very Seldom, ② Seldom, ③ From time to time, ④ Often, ⑤ Very Often

1. Even if I am somewhere else with my thoughts, I can focus on what's going on in important moments.
2. If need be, I can let unpleasant thoughts and experiences happen without having to get rid of them immediately.
3. I can look at hindering thoughts from a distance without letting them control me.
4. Even if thoughts and experiences are confusing me I can notice something like a steady core inside of me.
5. I determine what's important for me and decide what I want to use my energy for.
6. I engage thoroughly in things that are important, useful, or meaningful to me.

Appendix D. The Personalized Psychological Flexibility Index

Reference: Kashdan, T. B., Disabato, D. J., Goodman, F. R., Doorley, J. D., & McKnight, P. E. (2020). Understanding psychological flexibility: A multimethod exploration of pursuing valued goals despite the presence of distress. *Psychological Assessment, 32*(9), 829.

Instruction: Please take a few moments to think of an important goal that you are working on. This goal can be in any area of your life, but it must be one and only one goal. Don't choose too quickly. Take a few moments to think about it. After you choose the goal, please write it in the following blank: _____

For the following statements, select the rating that best describes YOUR thoughts and feelings about this goal.

Scale: ① Strongly Disagree, ② Disagree, ③ Somewhat Disagree, ④ Neither Agree Nor Disagree, ⑤ Somewhat Agree, ⑥ Agree, ⑦ Strongly Agree

1. This goal is central to my life.
2. I find this goal challenging.
3. I feel stressed pursuing this goal.
4. I experience negative emotions while pursuing this goal (such as anxiety, frustration, guilt, anger, disappointment).
5. I avoid the most difficult goal-related tasks.
6. I put off pursuing this goal when I could be doing a more enjoyable task.
7. When I feel stressed pursuing this goal, I give up.
8. I get so caught up in thoughts and feelings that I am unable to pursue this goal.
9. When I feel discouraged, I let my commitment for this goal slide.
10. I accept the setbacks while pursuing this goal.
11. While pursuing this goal, I try to accept my negative thoughts and feelings rather than resist them.
12. I am willing to experience negative thoughts and emotions related to this goal.
13. I accept things I cannot change about this goal.
14. While pursuing this goal, I can observe unpleasant feelings without being drawn into them.
15. When faced with obstacles related to this goal, my frustration serves to energize me.
16. I find worrying helpful to solving goal-related problems.
17. When people distract me from this goal, I use any anger that arises to stay focused.
18. I get motivated by guilt when I fail to meet my own expectations pursuing this goal.
19. I find unpleasant emotions useful for reaching this goal.

Appendix E. The Distress Tolerance Scale

Reference: Simons, J. S., & Gaher, R. M. (2005). The Distress Tolerance Scale: Development and validation of a self-report measure. *Motivation and emotion*, 29(2), 83-102.

Instruction: Please respond to the following items.

Scale: ① Strongly Agree, ② Mildly Agree, ③ Agree and Disagree Equally, ④ Mildly Disagree, ⑤ Strongly Disagree

1. Feeling distressed or upset is unbearable to me.
2. When I feel distressed or upset, all I can think about is how bad I feel.
3. I can't handle feeling distressed or upset
4. My feelings of distress are so intense that they completely take over.
5. There is nothing worse than feeling distressed or upset.
6. I can tolerate being distressed or upset as well as most people.
7. My feelings of distress or being upset are not acceptable.
8. I'll do anything to avoid feeling distressed or upset.
9. Other people seem to be able to tolerate feeling distressed or upset better than I can.
10. Being distressed or upset is always a major ordeal for me.
11. I am ashamed of myself when I feel distressed or upset.
12. My feelings of distress or being upset scare me.
13. I'll do anything to stop feeling distressed or upset.
14. When I feel distressed or upset, I must do something about it immediately.
15. When I feel distressed or upset, I cannot help but concentrate on how bad the distress actually feels.

Appendix F. The Depression Anxiety and Stress Scale

Reference: Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British journal of clinical psychology*, 44(2), 227-239.

Instruction: Please respond to the following items.

Scale: ① Did not apply to me at all ② Applied to me to some degree, or some of the time ③ Applied to me to a considerable degree, or a good part of time ④ Applied to me very much, or most of the time

1. I found it hard to wind down.
2. I was aware of dryness of my mouth.
3. I couldn't seem to experience any positive feeling at all.
4. I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion).
5. I found it difficult to work up the initiative to do things.
6. I tended to overreact to situations.
7. I experienced trembling (eg, in the hands).
8. I felt that I was using a lot of nervous energy.
9. I was worried about situations in which I might panic and make a fool of myself.
10. I felt that I had nothing to look forward to.
11. I found myself getting agitated.
12. I found it difficult to relax.
13. I felt down-hearted and blue.
14. I was intolerant of anything that kept me from getting on with what I was doing.
15. I felt I was close to panic.
16. I was unable to become enthusiastic about anything.
17. I felt I wasn't worth much as a person.
18. I felt that I was rather touchy.
19. I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat).
20. I felt scared without any good reason.
21. I felt that life was meaningless.

Appendix G. The Questionnaire On Self-transcendence

Reference: Fishbein, J. N., Baer, R. A., Correll, J., & Arch, J. J. (2022). The Questionnaire On Self-transcendence (QUEST): a measure of trait self-transcendence informed by contextual cognitive behavioral therapies. *Assessment, 29*(3), 508-526.

Instruction: Thinking about your general everyday experience, please rate how true each statement below is for you.

Scale: ① Never true, ② Very rarely true, ③ Seldom true, ④ Sometimes true, ⑤ Often true, ⑥ Almost always true, ⑦ Always true

1. I see a connection between who I was in the past and who I am today.
2. Even though there have been many changes in my life, I'm aware of a part of me that has witnessed it all.
3. I feel compassion for people who have harmed me.
4. I allow my emotions to come and go without struggling with them.
5. I am able to separate myself from my thoughts and feelings.
6. I feel connected even to people I don't know.
7. Though I have had many roles in my life, I have a sense of self that is stable and enduring.
8. I have a basic sense of myself that doesn't change even though my thoughts and feelings do.
9. It seems like all living beings on Earth are related.
10. When I feel distressed I can notice what is happening without being overwhelmed.
11. It seems like part of me is always the same, no matter where I am.
12. I experience my self as more than my thoughts and feelings.
13. I feel connected to all living beings, including plants and animals.
14. It seems like part of me holds all the experiences I have.
15. I can observe experiences in my body and mind as events that come and go.
16. I empathize with people who I haven't met.
17. I am able to step back from my emotions and observe them from a separate point of view.
18. As I look back on my life, I am aware of a basic part of me that remains unchanged.
19. I feel connected to people who speak a different language than me.
20. I see a connection between who I am at all places and times.
21. I am able to notice my changing thoughts without getting caught up in them.

Appendix H. The Cognitive Fusion Questionnaire

Reference: Gillanders, D. T., Bolderston, H., Bond, F. W., Dempster, M., Flaxman, P. E., Campbell, L., ... & Remington, B. (2014). The development and initial validation of the cognitive fusion questionnaire. *Behavior therapy, 45*(1), 83-101.

Instruction: Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

Scale: ① Never true, ② Very seldom true, ③ Seldom true, ④ Sometimes true, ⑤ Frequently true, ⑥ Almost always true, ⑦ Always true

1. My thoughts cause me distress or emotional pain.
2. I get so caught up in my thoughts that I am unable to do the things that I most want to do.
3. I over-analyse situations to the point where it's unhelpful to me.
4. I struggle with my thoughts.
5. I get upset with myself for having certain thoughts.
6. I tend to get very entangled in my thoughts.
7. It's such a struggle to let go of upsetting thoughts even when I know that letting go would be helpful.

Appendix I. The Engaged Living Scale

Reference: Trompetter, H. R., Ten Klooster, P. M., Schreurs, K. M., Fledderus, M., Westerhof, G. J., & Bohlmeijer, E. T. (2013). Measuring values and committed action with the Engaged Living Scale (ELS): psychometric evaluation in a nonclinical sample and a chronic pain sample. *Psychological assessment*, 25(4), 1235.

Instruction: The following questions concern ‘value based living’. Values are the choices that we make about how we want to live our lives. This means that you determine what you believe to be important in your life, what makes it all worthwhile and what motivates you. The question that you ask yourself here is what do I want from life? What do I consider important and what sort of person do I want to be? This questionnaire is about learning to identify these variables and to live according to them

Scale: ① Completely disagree, ② Disagree, ③ Neither agree nor disagree, ④ Agree, ⑤ Completely agree

1. I have values that give my life more meaning.
2. I know what motivates me in life.
3. I believe that I’ve found important values to live according to.
4. I know exactly what I want to do with my life.
5. I make choices based on my values, even if it is stressful.
6. I know how I want to live my life.
7. I know what I want to do with my life.
8. I believe that my values are really reflected in my behavior.
9. I believe that how I behave fits in with my personal wants and desires.
10. My emotions don’t hold me back from doing what’s important to me.
11. I live the way I always intended to live.
12. I am satisfied with how I live my life.
13. Nothing can stop me from doing something that’s important to me.
14. I believe that I am living life to the full right now.
15. I make time for the things that I consider important.
16. I feel that I am living a full life.

Appendix J. The Big five inventory (Neuroticism subscale)

Reference: John, O. P., Donahue, E. M., & Kentle, R. L. (1991). Big five inventory. *Journal of Personality and Social Psychology*.

Instruction: Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

Scale: ① Disagree strongly, ② Disagree a little, ③ Neither agree nor disagree, ④ Agree a little, ⑤ Agree strongly

I see myself as someone who

1. Is depressed, blue.
2. Is relaxed, handles stress well.
3. Can be tense.
4. Worries a lot.
5. Is emotionally stable, not easily upset.
6. Can be moody.
7. Remains calm in tense situations.
8. Gets nervous easily.

Appendix K. The Positive and Negative Affect Schedule (Negative affect subscale)

Reference: Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). *Journal of cross-cultural psychology*, 38(2), 227-242.

Instruction: Indicate the extent you have felt this way over the past week.

Scale: ① Very slightly or not at all, ② A little, ③ Moderately, ④ Quite a bit, ⑤ Extremely

1. Distressed
2. Upset
3. Guilty
4. Scared
5. Hostile
6. Irritable
7. Ashamed
8. Nervous
9. Jittery
10. Afraid