



Evaluating the Convergent and Divergent Validity of the Children's Psychological Flexibility Questionnaire (CPFQ) among Children with Autism

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Abstract

Objectives The current study examines the convergent and divergent validity between the Children's Psychological Flexibility Questionnaire (CPFQ) and other established measures among children with autism.

Method Twenty-nine children with autism completed the CPFQ, the Avoidance and Fusion Questionnaire for Youth (AFQ-Y), the Acceptance and Action Questionnaire (AAQ-II), and the Child and Adolescent Mindfulness Measure (CAMM).

Results Results showed a significant negative correlation between the CPFQ and the AFQ-Y ($r = -.449, p = .015$) with a medium to large effect size, and divergent validity between the CPFQ and the AAQ-II ($r = -.324, p = .086$), and the CAMM ($r = .279, p = .143$) with a small to medium effect size.

Conclusion These results illustrate the value of self-report measures using child-specific language to target and measure the six psychological flexibility processes. This result highlights the benefit of the CPFQ by using child-specific language and measuring all six processes of the psychological flexibility model. Implications for clinical practice and suggestions for future research are discussed.

Keywords Psychological flexibility · Autism · Acceptance and commitment therapy · Behavior analysis

Persistent deficits in social communication, social interaction, and restricted or repetitive patterns of behavior, interests, or activities are the primary characteristics of autism spectrum disorders (ASD; American Psychiatric Association, 2013). Individuals with deficits in language and communication may also struggle with social-emotional skills related to behavioral rigidity, psychological inflexibility, and the tendency to respond to events based on their literal truth rather than direct contingencies (Szabo, 2019). For many, it can be difficult to alter one's behaviors and adapt to changes in the environment that differ from previously learned routines (D'Cruz et al., 2013). However, this rigidity, or inflexibility, affects more than just overt behaviors. In addition to engaging in inflexible behaviors, individuals with autism may also

struggle to be psychologically flexible, or to contact the present moment more and engage in meaningful, value-driven behaviors. This inability to be psychologically flexible can be especially problematic as it often results in increased psychological distress (Hayes et al., 2011).

Applied behavior analytic (ABA) approaches are common for teaching skills to children with autism. However, traditional ABA interventions typically do not assess or target private events, such as thoughts, feelings, emotions, and psychological well-being. Thus, research has begun to evaluate the effectiveness of acceptance and commitment training (ACT) for improving both psychological and behavioral flexibility in children with autism (e.g., Pahnke et al., 2014; Szabo, 2019). Studies have shown ACT-based interventions to be effective in reducing symptoms related to autism. For example, Eilers and Hayes (2015) demonstrated the effectiveness of using cognitive defusion to decrease repetitive and restrictive problem behaviors in children with autism. Similarly, Szabo (2019) successfully implemented ACT with children with autism to reduce inflexible behaviors and increase mands related to rules while playing a game. As ACT interventions are becoming increasingly more popular among behavior analysts, it

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is essential that practitioners can accurately assess psychological flexibility to continue providing meaningful and data-informed interventions.

The psychological flexibility model is comprised of six processes, which includes acceptance, defusion, self-as-context, flexible attention to the present moment, values, and committed action. Each of these six processes plays a vital role in determining how well individuals can adapt to changing and challenging life circumstances (Hayes et al., 2011). Self-reported measures, which ask the individual to provide subjective ratings on a series of descriptions using Likert-type scales, are most commonly used to measure psychological flexibility. Standard self-report measures include the Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011), the Avoidance and Fusion Questionnaire for Youth (AFQ-Y; Greco et al., 2008), and the Child and Adolescent Mindfulness Measure (CAMM; Greco et al., 2011). However, when applying these measures to children with autism, several issues may arise. Children with autism often experience difficulties with complex language. The language used in these surveys is based on the intended respondents' age (i.e., children, adolescents, or adults). However, the language may be too complicated or abstract for children with autism to comprehend. Although some measures are specifically designed for children and adolescents (e.g., the AFQ-Y and the CAMM), it is unclear whether the language deficit among individuals with autism will negatively affect the result's accuracy. Besides the concern on language, existing measures may encounter other issues during clinical practices. Some measures focus on a global indicator (e.g., AAQ-II and AFQ-Y) without differentiating each process of the psychological flexibility model. Isolating each of the six processes and obtaining an overall measure of psychological flexibility may provide valuable information. Moreover, most existing scales utilize single-direction scoring, making it easier for participants to infer the measure's purpose. As participants are measured repeatedly for progress monitoring, they may become privy to the expected answers.

Dixon and Paliliunas (2018) developed the Children's Psychological Flexibility Questionnaire (CPFQ) to address these issues. The CPFQ is a 24-item psychological flexibility measure for children which presents items in child-friendly language. The CPFQ contains subscales for each of the six psychological flexibility processes with an equal number of items for each process. There are four items for each of the processes, and two of those items are reverse scored. In addition to the self-report measure for children, the CPFQ has a corresponding caregiver version (CPFQ-CR), allowing caregivers to report their child's psychological flexibility. The caregiver report can be used when the child cannot accurately respond to the questions or can be used to supplement the child's report for increased clinical utility.

To date, no study has examined the psychometric properties of the CPFQ or to what extent the results of the CPFQ correspond to established measures. The current study aims to

examine the convergent and divergent validity of the CPFQ in order to gain a further understanding of using psychological flexibility measures in children with autism. Specifically, we expected a moderate to high level of correlation between the CPFQ and measures that are designed specifically for children and teenagers that measures psychological flexibility, while expecting low level of correlation between the CPFQ and measures that are not designed specifically for children, or measures that only capture a subset of constructs of the psychological flexibility model.

Methods

Participants

Twenty-nine children ranging in age from 6 to 16 ($M = 10.34$, $SD = 2.36$) participated in the current study. Twenty-one had a primary diagnosis of autism, and three were diagnosed with ADHD. One participant was diagnosed with ODD and two with cognitive delays, and two had no formal diagnosis. Caregivers verified participants' diagnosis when providing consent. All participants were recruited from a clinic at a mid-western university that provided behavior analytic services to individuals with autism and related disabilities. Before participating in the current study, 26 of the participants (90%) had previously participated in ACT-based sessions.

Procedures

Before participants completed the questionnaires, researchers obtained parental and child consent. Participants completed paper copies of the AAQ-II, AFQ-Y, CAMM, and CPFQ, and their parents/guardians completed a paper copy of the CPFQ-CR on the same day. If a participant had difficulty reading, a graduate student therapist would read the questions and the scale options to the participant; however, therapists did not explain the questionnaire items to participants. Researchers informed participants and their parents to skip questions that they felt confused about or uncomfortable answering.

Measures

Childhood Psychological Flexibility Questionnaire – Child Report and Caregiver Report (CPFQ; Dixon & Paliliunas, 2018) The CPFQ – Child Report (CPFQ) is a self-report questionnaire containing 24 items. The questionnaire uses child-friendly language, so individuals with a limited verbal repertoire can understand the questions. For example, item 19 reads, “If I get angry, it means I messed up.” Item 23 reads, “Grown-ups tell me what is important to me.” Participants use a 5-point Likert scale to indicate if the behavior never (0),

rarely (1), sometimes (2), often (3), or always (4) occurs. At the top of the questionnaire, five circles are progressively shaded, each serving as a visual which corresponds with the rating scale. For example, an empty circle corresponds with never (0), and a blacked-out circle corresponds with always (4). Each item on the CPFQ describes a behavior associated with one of the six psychological flexibility processes. Each process has four corresponding questions, two of which are reverse scored. Participants' responses on each item were combined into six core process subtotals based on the scoring manual's instructions. The six core processes' subtotals are summed to calculate a psychological flexibility total score.

The CPFQ – Caregiver Report (CPFQ-CR) is a self-report questionnaire that the caregiver's responds to evaluate their child's psychological flexibility. The questionnaire contains 24 items, each corresponding to a question listed on the CPFQ and follows the same structure. For example, item 5 on the child report reads, "I notice when my body feels different." Correspondingly, item 5 on the caregiver report reads, "The child reports changes in the body feeling at appropriate times (change of temperature, pressure placed)." Caregivers' ratings for each item were combined into six core process subtotals which were then summed into a psychological flexibility total score. The total score on both CPFQ and CPFQ-CR ranges from 0 to 96, with higher scores indicating greater psychological flexibility.

Avoidance and Fusion Questionnaire for Youth (AFQ-Y; Greco et al., 2008) The AFQ-Y is a 17-item self-report questionnaire developed to measure psychological inflexibility in children and adolescents and demonstrates strong internal consistency ($\alpha = .90$; Greco et al., 2008). The questionnaire uses a 5-point Likert-type scale for participants to rate how true they perceive each statement. Examples of the statements include "My life won't be good until I feel happy; My thoughts and feelings mess up my life." Participants' ratings on each item were combined into a total score. The total score can range from 0 to 68, with higher scores indicating greater psychological inflexibility.

Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011) The AAQ-II is a 7-item self-report measure which demonstrates good internal consistency ($\alpha = .84$; Bond et al., 2011). The questionnaire uses a 7-point Likert-type scale for participants to rate how true they perceive each statement. Examples of statements included "I'm afraid of my feelings; Worries get in the way of my success." Participants' ratings on each item were combined into a total score. The total score can range from 7 to 49, with higher scores indicating greater psychological inflexibility.

Child and Adolescent Mindfulness Measure (CAMM; Greco et al., 2011) The CAMM is a 10-item self-report questionnaire developed to measure a child or adolescent's ability to observe,

accept, and act with mindful awareness. The questionnaire demonstrates good internal consistency ($\alpha = .80$; Greco et al., 2011) and uses a 5-point Likert-type scale for participants to rate how they perceive each statement. Examples of statements include "I get upset with myself for having certain thoughts; I stop myself from having feelings that I don't like." Participants' ratings on each item were reverse scored and then combined into a total score. The total score can range from 0 to 40, with higher scores indicating higher levels of mindfulness.

Data Analyses

We analyzed the convergent and divergent validity between the recently developed CPFQ and the AFQ-Y, AAQ-II, and CAMM. The Pearson correlation coefficient was calculated to investigate the degree to which the CPFQ results agreed and disagreed with the other measures' results. The alpha level was set at .05 for all statistical tests.

Results

All 29 participants completed the questionnaires. However, caregivers of two participants were unable to complete the CPFQ-CR due to scheduling conflicts. No items were skipped by any participants on any of the questionnaires. Due to the small sample size, a post hoc power analysis was conducted to avoid potential type I and type II errors with regard of using *p*-value to interpret the statistical significance. The power analysis yielded a power of .71, indicating a high level of confidence that the observed correlation was not the result of a biased sample size.

Participant scores on the CPFQ ranged from 37 to 76 ($M = 57.07$, $SD = 9.16$). Caregiver scores on the CPFQ-CR ranged from 35 to 68 ($M = 50.59$, $SD = 9.96$). On the AFQ-Y, participants' scores ranged from 1 to 59 ($M = 27.07$, $SD = 14.99$). Participants' AAQ-II scores ranged 7 to 43 ($M = 22.14$, $SD = 8.11$). Finally, on the CAMM, scores ranged from 8 to 37 ($M = 24.76$, $SD = 7.90$). The correlation matrix for all measures is summarized in Table 1. As seen in Fig. 1, a significant

Table 1 Correlation matrix

	CPFQ	CPFQ-CR	AFQ-Y	AAQ-II	CAMM
CPFQ		-.283	-.449*	-.324	.279
CPFQ-CR	-.283		.168	.044	-.073
AFQ-Y	-.449*	.168		.694**	-.689**
AAQ-II	-.324	.044	.694**		-.566**
CAMM	.279	-.073	-.689**	-.566**	

*Correlation is significant at the .05 level (2-tailed)

**Correlation is significant at the .01 level (2-tailed)

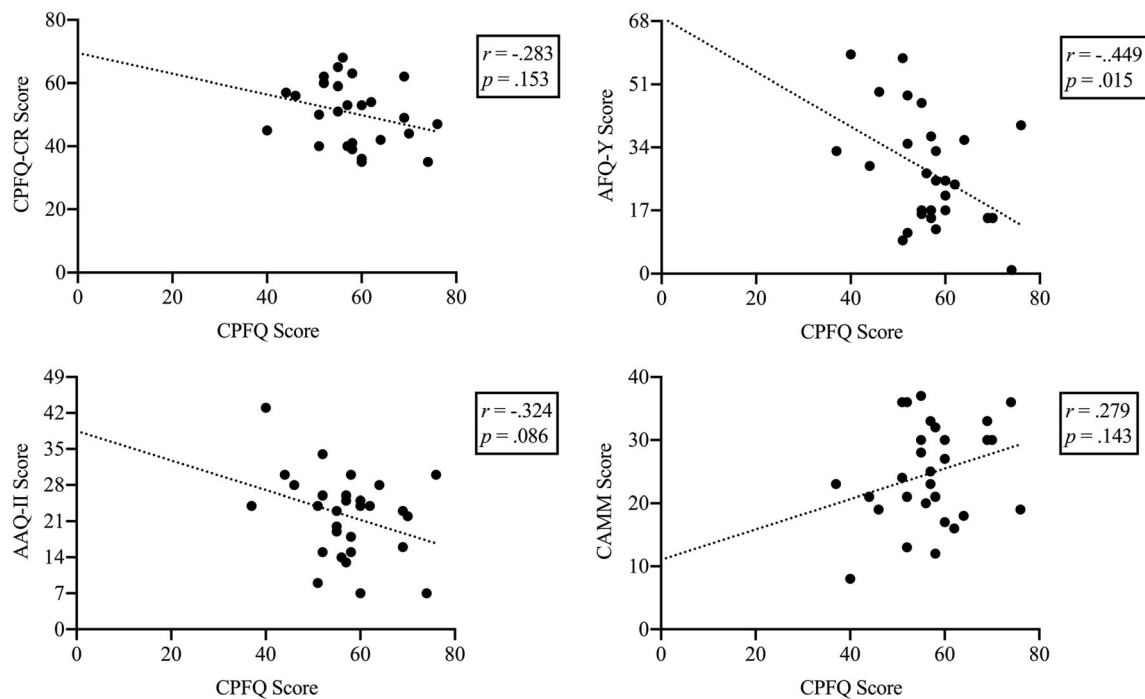


Fig. 1 Correlations between scores on the CPFQ and other measures

negative correlation was observed between the CPFQ and AFQ-Y ($r = -.449$, $p = .015$), with a medium to large effect size. However, the correlations between the CPFQ and CPFQ-CR ($r = -.283$, $p = .153$), AAQ-II ($r = -.324$, $p = .086$), and CAMM ($r = .279$, $p = .143$) were not significant, with small to medium effect size. Additionally, the correlation between CPFQ-CR and the other measures was not significant.

Discussion

The current study aims to examine the convergent and divergent validity of the CPFQ in order to gain a further understanding of using psychological flexibility measures in children with autism. Specifically, we expected a moderate to high level of correlation between the CPFQ and measures that are designed specifically for children and teenagers that measures psychological flexibility while expecting low level of correlation between the CPFQ and measures that are not designed specifically for children, or measures that only capture a subset of constructs of the psychological flexibility model.

The purpose of the current study was to evaluate the convergent and divergent validity of the CPFQ by examining the correlation between the CPFQ and other commonly used psychological flexibility questionnaires. The current study provided preliminary evidence supporting the convergent validity between the CPFQ and AFQ-Y, which are both designed to assess psychological flexibility in children. As individuals with autism often demonstrate deficits in language, the

complexity of the language used in psychological flexibility self-report measures plays an essential role in the accuracy of results. The language used in both the CPFQ and AFQ-Y was intended to be at a level that younger participants could understand. For example, CPFQ item 17 reads, “I give up when things are too hard.” Similarly, AFQ-Y item 5 reads, “I don’t try out new things if I’m afraid of messing up.” These expressions demonstrate the use of child-friendly language to describe a scenario.

The current study also provided preliminary evidence supporting the divergent validity between the CPFQ, AAQ-II, and CAMM, as the correlation was not statistically significant. There are several potential reasons why the CPFQ did not converge with these measures. First is the language and questions used on the AAQ-II and CAMM. The AAQ-II was not explicitly designed for children and, as a result, may contain highly abstract language. For example, item 1 on the AAQ-II reads, “My painful experiences and memories make it difficult for me to live a life that I would value.” This description could be difficult for children to understand, especially those with language deficits. Although the CAMM was designed to be used with children, some items may be too specific that a participant with autism might feel they are not applicable. For example, item 2 on the CAMM reads, “At school, I walk from class to class without noticing what I’m doing.” Although the question describes a scenario that assesses the child’s present-moment awareness, this example could be too specific or could be an experience the child has never noticed. The child may respond inaccurately due to not fully understanding the content of the question.

A second potential reason for the difference between the questionnaires is their construct. The AAQ-II primarily focuses on acceptance and experiential avoidance (Bond et al., 2011). The CAMM primarily focuses on present-moment awareness and acceptance (Greco et al., 2011). Although the construct of both measures is related to the construct of psychological flexibility, these assessments do not measure all six processes. The CPFQ, however, measures all six processes of the psychological flexibility model. Thus, it is possible that the correlation between these instruments was not strong enough to yield statistically significant outcomes. Additionally, all items on the AAQ-II and CAMM are unidirectional, whereas the CPFQ contains reverse-scored items. The reverse-scored items included on the CPFQ describe inflexible behavior rather than merely including negation or opposite items. As indicated by prior research in psychometric testing, these items' inclusion may impact test results (Schriesheim & Eisenbach, 1995). Including such items and how they affect the result's accuracy and validity should be further examined.

Overall, these results suggest correlations between an established child psychological flexibility measure, the AFQ-Y, and the CPFQ. Although this result is preliminary, these findings have several clinical implications. In addition to providing a global measure of psychological flexibility, the CPFQ directly measures each of the six processes. By isolating each process, practitioners have a better understanding of which processes to target in therapy. Results on the CPFQ may serve as client-specific information to help practitioners with case conceptualization and facilitating therapy sessions. For example, if the child scores low on present-moment awareness and values, the clinician would likely focus on value clarification and mindfulness exercises. Additionally, isolating the six processes can also lead to better progress monitoring, as practitioners can compare the clients' improvement on each process throughout the intervention. As ACT and ABA interventions focusing on social-emotional development become increasingly popular, behavior analysts can utilize comprehensive assessment measures, such as the CPFQ, to better measure the private events experienced by their clients.

Limitations and Future Research Directions

Due to its preliminary nature, the current study suffers several limitations. In addition to the relatively small sample size, participant age range, level of disability, and ethnic diversity were limited. It should be pointed out that the observed divergent validity between the CPFQ could be attributed to potential type II errors due to the small sample size, especially given the small to moderate strength of the correlation. Nevertheless, a more conservative approach was adopted,

where the traditional .05 alpha level was used. Given the relatively strong result of the post hoc power analysis, the likelihood of a type II error was low, but future research should address this limitation by including a larger sample size. Although convergent and divergent validity are important indices of the measure's clinical utility, analyses of other psychometric properties of these measures should be conducted in future research. Another limitation lies in self-report measures. Variables such as recent life changes, daily events, and the time of day assessed may influence participants' responses when completing the measures, possibly affecting the results. Additionally, all measures were administered in succession. As the assessments' content was similar, participants may have experienced fatigue as they completed the measures. Lastly, the measures contained complex language used to describe private events, and it was uncertain the degree to which participants were able to understand the questions accurately.

Future research should continue to examine the overall psychometric properties of the CPFQ, such as construct validity, test-retest reliability, and internal consistency. The convergent validity of CPFQ with other measures could be further established by replicating the current study with a more extensive and more diverse sample. Future research could also use ACT-naïve participants to reduce the potential confound. All participants in the current study had relatively robust language abilities, and research could utilize participants impacted by ASD to various degrees. Research may also examine the difference in psychological flexibility between individuals with ASD and those without ASD. Finally, it may be beneficial to examine the relationship between psychological flexibility and language and cognition skills development.

Author Contribution KB executed the study and collaborated with the design of the study. JH collaborated with the design of the study, assisted in executing the study, and assisted in writing the paper. ZY assisted with the data analyses and assisted in writing parts of the paper. MD assisted in designing the study and collaborated in the writing and editing of the final manuscript. All authors approved the final version of the manuscript for submission.

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Declarations

Ethics Approval The Human Subjects Committee approved the content and procedure of this study at the Southern Illinois University Carbondale (Date: 08/13/19, Protocol: 15334).

Consent to Participate Written informed consent was obtained for all participants.

Conflict of Interest Mark R. Dixon receives small royalties from the book which the CPFQ was originally published within. The CPFQ in

its entirety is now available free online at <https://www.acceptidentifymove.com>. The remaining authors declare no conflicts of interest.

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