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A computer-based avatar task can differentiate avoidant and non-avoidant coping styles

M. T. Allen¹, C. E. Myers^{2,3}

¹=School of Psychological Sciences, University of Northern Colorado, Greeley, CO, USA

²=Department of Veterans Affairs, VA New Jersey Health Care System, East Orange, NJ, USA

³=Department of Pharmacology, Physiology, & Neuroscience, New Jersey Medical School, Rutgers University, Newark, NJ, USA

Abstract

Background/Objective: Coping styles play a role in how individuals respond to stress and therapy. One aspect of coping which has been linked to adverse outcomes including anxiety disorders and PTSD is avoidance. However, a tendency to avoid may affect the accuracy of paper and pencil inventories used to identify avoidant temperaments. Previously, we showed that a computer-based task in which an on-screen “avatar” is guided through a series of onscreen events could predict avoidance including behavioral inhibition, harm avoidance, and self-reported PTSD symptoms. Since some coping styles involve avoidance, we extended this work to determine whether scores on the avatar task would also differentiate avoidant and non-avoidant coping styles as measured by the Brief COPE.

Methods: One hundred and fifty undergraduates voluntarily completed the avatar task and the Brief COPE.

Results: Scores on the avatar task had a significant positive relationship with an aggregate score for the five avoidant coping styles and a significant negative relationship with an aggregate score for the nine non-avoidant coping styles.

Conclusions: The effectiveness of the avatar task to differentiate coping styles based on avoidance further validates this task and also shows selectivity to avoidant coping styles as opposed to other non-avoidant coping styles.

1. Introduction

Coping styles play a role in determining how individuals respond to stress, traumatic events, or even subsequent attempts at therapy. One aspect of coping which has been linked to adverse outcomes is avoidance. Avoidance coping has been deemed maladaptive (Penley, Tomaka, & Wiebe, 2002) and has been associated with negative outcomes such as

Corresponding author: M. T. Allen, School of Psychological Sciences, University of Northern Colorado, 501 20th St, Greeley, CO 80639, Ph: 970 351 2532, Todd.Allen@unco.edu.

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depression, smoking, and panic attacks (Haaga, Thorndike, Friedman-Wheeler, Pearlman, & Wernicke, 2004; Ottenbreit & Dobson, 2004). Individuals with an avoidance-focused coping style are also more at risk for acute stress reactions to traumatic events (Bartone, Ursano, Wright, & Ingraham, 1989; Bryant & Harvey, 1995; Johnsen et al., 1998; Johnsen, Eid, Laberg, & Thayer, 2002). Several avoidance related personality factors have been put forth as risk factors for the development of anxiety disorders and PTSD. One such personality temperament is behavioral inhibition or BI (Kagan, Reznick, & Snidman, 1987; Morgan, 2006). BI is defined as a temperamental tendency to withdraw from or avoid novel social and non-social situations (Kagan et al., 1987; Morgan, and includes social reticence and enhanced reactivity to novelty, threat, and uncertainty (Hirshfeld et al., 1992; Schwartz, Wright, Shin, Kagan, & Rauch, 2003; Schwartz, Wright, Shin, Kagan, Whalen, et al., 2003). BI is considered a vulnerability factor for the development of anxiety-related disorders as well as PTSD (North, Hong, Suris, & Spitznagel, 2008).

One way in which BI has been commonly assessed is through paper and pencil self-report inventories such as the Adult Measure of Behavioural Inhibition (AMBI; Gladstone & Parker, 2005). However, self-report measures have some limitations in clinical settings especially in the context of high levels of avoidance behaviors. In a clinical setting, clients may under- or over-report symptoms out of a desire to obtain or avoid a clinical diagnosis, or because psychopathology limits the ability to introspect and accurately judge one's own behavior with respect to social norms. In an attempt to limit these possible biases with self-report, especially for avoidant individuals, an objective behavioral measure of avoidance was developed as a computer-based task in an interactive virtual environment (Myers, Kostek, et al., 2016). In this task, the participant selected an onscreen character ("avatar") and then guided the avatar through several scripted scenarios. The avatar task was designed to assess the personality factor of behavioral inhibition (BI). Myers, Kostek, et al. (2016) demonstrated that avatar task could accurately predict participants' scores on the AMBI (Gladstone & Parker, 2005). In subsequent work, Myers, Radell, et al. (2016) showed that scores on the avatar task positively correlated with PTSD symptom severity, specifically avoidance symptoms. More recent work has supported the ability of the avatar task to assess behavioral avoidance as well as differentiate other tendencies. For example, Allen, Jameson, and Myers (2017) reported a strong positive relationship between scores on the avatar task and harm avoidance, but not reward dependence or novelty seeking, as measured by the Tridimensional Personality Questionnaire (TPQ, Cloninger, Przybeck, & Svrakic, 1991). Allen (2018) found that the avatar task was related to behavioral but not cognitive avoidance as tested by the cognitive behavioral avoidance scale (CBAS, Ottenbreit & Dobson, 2004). Overall, these findings strengthen support for the avatar task as a viable measure of avoidant behaviors. An aspect of avoidance yet to be explored with the avatar task is avoidant coping. A widely used inventory for assessment of coping styles is the Brief Coping Orientation to Problems Experienced (Brief COPE; Carver, 1997). The Brief COPE consists of twenty-eight items that measure fourteen coping styles including acceptance, active coping, behavioral disengagement, denial, emotional support, humor, instrumental support, planning, positive reframing, religion, self-blame, selfdistraction, substance use, and venting. Kasi et al. (2012) grouped active coping, acceptance, emotional support, humor, instrumental support, positive reframing, religion as adaptive coping styles, while behavioral

disengagement, denial, self-blame, self-distraction, substance use, and venting were grouped as maladaptive coping styles. More recently, Baumstarck et al. (2017) reported that the Brief COPE has a four-factor structure including the ten items measuring behavioral disengagement, self-distraction, substance use, denial, and self-blame which comprise an avoidance factor. The other 18 items separate into three factors including seeking social support (8 items), problem solving (4 items), and positive thinking (6 items) which do not involve avoidance behaviors. Based on this distinction between avoidant and non-avoidant coping styles, we examined whether avatar scores can differentiate coping styles based on avoidant and non-avoidant behaviors. Using the avoidant factor identified by Baumstarck et al. (2017), we hypothesized that avoidant coping styles including behavioral disengagement, denial, self-blame, self-distraction, and substance use would be positively correlated to scores on the avatar task. We further hypothesized that non-avoidant coping styles such as active coping, acceptance, emotional support, humor, instrumental support, planning, positive reframing, religion would be negatively correlated to scores on the avatar task.

2. Methods

2.1. Participants

One hundred and fifty undergraduates voluntarily completed this study for partial research credit for an introductory psychology course. Our sample included 83 females and 67 males with a mean age of 19.2 years ($SD = 3.6$, range 18–52 years) and a mean education level of 12.5 years ($SD = .93$). Ethnicity of our sample was mainly Caucasian ($n = 103$), followed by Hispanic ($n = 22$), African-American ($n = 7$), East Asian ($n = 3$), South Asian, ($n = 2$), and multi-racial ($n = 8$). All participants provided written informed consent before participating. Procedures were approved by the Institutional Review Board at University of Northern Colorado and conformed to guidelines established by the Declaration of Helsinki and the U.S. Federal Government.

2.2. Instruments

All participants completed a short questionnaire about their demographic information including gender, age, years of education, and race/ethnicity. They also completed the Brief COPE (Carver, 1997), a twenty-eight item questionnaire that includes two items each for the following subscales: active coping, acceptance, behavioral disengagement, denial, emotional support, humor, instrumental support, planning, positive reframing, religion, self-blame, self-distraction, substance use, and venting. Participants responded to each item using a 4-point Likert-type scale ranging from don't do this at all (1 point), do this a little bit (2 points), do this a medium bit (3 points), and do this a lot (4 points). Total scores were summed across all 28 items. Total scores were calculated as well as each of the fourteen subscales. The Brief COPE has been reported to have satisfactory psychometric properties (Muller & Spitz, 2003) including test-retest reliability and convergent and divergent validity in a sample of undergraduates (Cooper, Katona, & Livingston, 2008). Studies with different language versions of the Brief Cope applied to a variety of samples have indicated that the two items for each subscale have acceptable internal validity as measured by Chronbach's alphas ranging from .57 to .89 (Carver, 1997; Cooper et al., 2008; Muller & Spitz, 2003; Yusoff, Low, & Yip, 2010).

Of specific interest to the current study, Baumstarck et al. (2017) also grouped the five coping styles of behavioral disengagement, denial, self-blame, self-distraction, and substance use, together as an aggregate avoidance factor while the remaining nine coping styles were grouped as non-avoidance coping styles, including positive thinking, problem solving, and social support. Baumstarck et al. (2017) reported acceptable internal reliability between the five subscales forming the aggregate avoidance score (Cronbach's $\alpha = .64$). Accordingly, we also computed aggregate avoidance and non-avoidance scores for each participant.

2.3. Computer-based task

The computer-based task was as previously described (Myers, Kostek, et al., 2016); an open-access version of the task software is available at Open Science Framework www.osf.io/zf3jv. The task took about 10 min for participants to complete. First, participants saw a screen with a selection of male and female avatars with various hair and skin color and were asked to choose one to represent them in the task. The task itself consisted of two scenarios where the avatar attended a party full of strangers as shown in Figure 1 and volunteered to help on a charity building project. The script included 20 decision points with a short text description and an image showing the avatar experiencing this event, along with three response options. The options included relatively avoidant, relatively non-avoidant, and intermediate actions. The script was designed so that all participants experienced the same sequence of events and response options regardless of their responses. At each choice point, the participant received 2 points for selecting the avoidant option, 1 for the intermediate option, and 0 for the non-avoidant option. Total scores could range from 0 (least avoidant) to 40 (most avoidant).

2.4. Data analysis

Pearson's product moment correlations were calculated between scores on the avatar task and the summed aggregate scores for the five avoidant scales and nine non-avoidant scales with a Bonferonni correction for repeated correlations which resulted in the significance threshold being reduced from 0.050.025. Gender effects were analyzed with an independent measures t-test.

3. Results

3.1. Paper and pencil inventories

The mean total score on the Brief COPE was 72.0 ($SD = 8.5$); there were no significant gender effects with the Brief COPE total score ($t(66) = 0.10, p = 0.92$) or the avoidance ($t(66) = 0.550, p = 0.58$) and non-avoidance ($t(66) = 0.481, p = 0.63$) aggregate scores. On the post-test questionnaire, all but twelve participants rated themselves as moderate or high in computer familiarity (questionnaire item #1, $M = 3.3, SD = 0.61$). Sixty participants (40%) reported regularly playing computer games. There were no gender differences in computer familiarity ($t(66) = 0.160, p = 0.87$). Chronbach's α for scales on the Brief COPE ranged from unacceptable (acceptance = 0.433) to excellent (substance use = 0.971) and are shown in Table 1.

3.2. Responses on the computer-based task

The mean total score on the avatar task was 18.0 (SD = 5.5). There were no significant differences ($t(66) = 0.732$, $p = 0.47$) in total avatar scores between males ($M = 17.3$, $SD = 5.1$) and females ($M = 18.0$, $SD = 5.6$). These avatar scores, and lack of a gender effect are consistent with previous studies with the avatar task with undergraduate samples (Allen, 2018; Allen et al., 2017; Myers, Kostek, et al., 2016) and veteran (Myers, Radell, et al., 2016). The current sample produced excellent internal reliability for the twenty items on the avatar task as indicated by a Chronbach's alpha of .981. This finding is consistent with prior reports of acceptable internal reliability (Myers, Kostek, et al., 2016; Myers, Radell, et al., 2016).

3.3. Relationship of avatar scores to avoidant and non-avoidant coping styles

Aggregate scores of the five avoidant styles had a significant positive relationship to scores on the avatar task ($r = 0.20$, $p < 0.01$). Aggregate scores calculated from the nine non-avoidant coping styles were significantly negatively related to scores on the avatar task ($r = -0.22$, $p < 0.01$). Pearson's correlation coefficients for individual subscales of the Brief COPE and scores on the avatar task are shown in Table 1.

4. Discussion

The goal of the current study was to investigate the ability of the avatar task, which was originally designed to assess behavioral inhibition, to differentiate coping styles based on aggregate avoidance and non-avoidance scores. We hypothesized that the avoidant coping styles would have a positive relationship with performance on the avatar task while the non-avoidant coping styles would have a negative relationship with scores on the avatar task. The current findings supported this hypothesis. The aggregate non-avoidance score had a significant negative relationship with scores on the avatar task while the aggregate score that combined behavioral disengagement, denial, self-blame, self-distraction, and substance use had a significant positive relationship with scores on the avatar task. Overall, the avoidant coping styles of behavioral disengagement, denial, self-blame, self-distraction, and substance use have been categorized as maladaptive by Kasi et al. (2012). Anxiety disorders involving maladaptive behaviors especially avoidance have been linked to more severe reactions to traumatic events (Bartone et al., 1989; Bryant & Harvey, 1995; Johnsen et al., 2002). For example, behavioral disengagement has been found to mediate the relationship between guilt and PTSD severity (Held, Owens, Schumm, Chard, & Hansel, 2011). Shipherd and Beck (2005) reported that suppressing and avoiding of intrusive thoughts has a maladaptive effect of increasing re-experiencing. Self-blame, along with avoidance coping, was related to greater PTSD symptom severity in sexual assault survivors (Ullman, Townsend, Filipas, & Starzynski, 2005). Overall, we found that the avatar task, designed to assess avoidant behavior based on BI, has a positive relationship with coping styles hypothesized to involve avoidant behaviors while having a negative relationship with coping styles hypothesized to involve non-avoidant behaviors. This provides a replication and validation of the prior work while extending it to show that avatar task scores correlate specifically with coping styles associated with avoidance, but not with other maladaptive coping styles that do not involve avoidance.

While this study provides preliminary support for the hypothesis that the avatar task can be used to differentiate avoidant and non-avoidant coping styles, the current study has some limitations. One limitation of the current study is the variable internal reliability for the coping subscales of the Brief COPE which ranged from unacceptable ($< .0.50$) to excellent (> 0.90). This variable internal reliability which has been noted by previous researchers (Carver, 1997; Cooper et al., 2008; Muller & Spitz, 2003; Yusoff et al., 2010) may be due in part to each scale only consisting of two items. Future work should include other coping scales with better internal reliability. The current study also utilized an undergraduate sample drawn from a population of young, high functioning, putatively healthy individuals. Another limitation which can be addressed in future work is to include measures of anxiety and depression to determine how avoidance is related. The avatar task has been tested previously with behavioral inhibition (Allen et al., 2017; Myers, Kostek, et al., 2016; Myers, Radell, et al., 2016), PTSD symptoms (Myers, Radell, et al., 2016), harm avoidance (Allen et al., 2017), and cognitive and behavioral avoidance (Allen, 2018), but not with direct measurements of anxiety or depression. Further work should include direct measurements of anxiety disorders and depression in an attempt to differentiate avoidant and non-avoidant coping styles as related to these psychopathologies.

The current study with the avatar task and coping styles involved a non-clinical population. The preliminary findings reported here should be extended to examine individuals suffering PTSD or some anxiety disorder to determine if the task can differentiate coping styles in clinical populations. The avatar task has been found to be correlated with PTSD symptoms, specifically avoidance symptoms. In addition, individuals with PTSD symptoms had significantly higher avatar scores than individuals without PTSD symptoms (Myers, Radell, et al., 2016). However, that study did not examine coping styles. An open question is whether avoidant coping styles predispose some individuals to PTSD, or whether individuals who have suffered traumatic exposures and developed PTSD adopt specific avoidant coping styles as part of the disorder. If the former, then based on the current results, the avatar task could be used to help identify people who pre-morbidly use some of the coping styles believed to confer risk for PTSD and anxiety.

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The host chats politely to you for a few moments, then excuses herself to check on something in the kitchen. You look around and realize you don't know anyone else there. You:

- ☐ Find someone who looks friendly, walk over, and say hi.
- ☒ Check out the food and drinks.
- ☐ Call your cousin Frank and ask when he's coming.

Go on.

Figure 1.

Sample screenshot from the computer-based task (Myers, Kostek, et al., 2016). In the first scenario, the avatar is invited to a party where he does not know anyone except the person who invited him. At each choice point, response options include relatively behaviorally inhibited, relatively noninhibited, or intermediate behaviors. In this case, the behaviorally inhibited choice was selected.

Table 1.

Coping styles' internal validity and relationships to avatar task scores.

Avoidant Coping Styles	Chronbach's alpha	Correlation to Avatar Score	Significance Level
Behavioral disengagement	0.676	0.21	0.05
Denial	0.809	0.20	0.05
Self-blame	0.769	0.19	0.05
Self-distraction	0.500	0.00	ns
Substance Use	0.971	−0.07	ns
Non-Avoidant Coping Styles	Chronbach's alpha	Correlation to Avatar Score	Significance Level
Acceptance	0.433	0.00	ns
Active coping	0.691	−0.21	0.05
Emotional support	0.836	−0.03	ns
Humor	0.861	−0.27	0.01
Instrumental support	0.851	−0.12	ns
Planning	0.670	−0.05	ns
Positive reframing	0.752	−0.39	0.001
Religion	0.875	−0.08	ns
Venting	0.594	0.12	ns

Note: Relationships between coping styles and the avatar score are measured by Pearson's correlation coefficients. Non-significant relationships are designated as ns.