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Validity of the Multidimensional Outcome Expectations for Exercise Scale in Continuing-Care Retirement Communities

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Objective: The current study examined the psychometric properties and validity of the Multidimensional Outcome Expectations for Exercise Scale (MOEES) in a sample of older adults with physical and functional comorbidities. ***Methods:*** Confirmatory factor analysis was used to examine the hypothesized 3-factor model in 108 older adults (*M* age 85 yr) residing in continuing-care retirement communities. ***Results:*** Analyses supported the 3-factor structure of the MOEES reflecting physical, social, and self-evaluative outcome expectations, with a 12-item model providing the best fit. Theorized bivariate associations between outcome expectations and physical activity, self-efficacy, and functional performance were all supported. ***Conclusions:*** The 12-item version of the MOEES appears to be a reliable and valid measure of outcome expectations for exercise in this sample of older adults with physical and functional comorbidities. Further examination of the factor structure and the longitudinal properties of this measure in older adults is warranted.

Keywords: measurement, factor analysis, physical activity, social cognitive

Having demonstrated beneficial effects across both age spectrum and disease states (Physical Activity Guidelines Advisory Committee, 2008), regular exercise is recommended for all individuals. Despite recent public health efforts to increase physical activity participation among older adults, most older adults tend to be sedentary, which, combined with age-related declines in aerobic capacity and muscle strength, contributes to worsening functional status. A host of studies have examined physical activity in older adults and the physical, cognitive, psychosocial, and environmental factors that affect physical activity participation in this population (De Bourdeaudhuij & Sallis, 2002; McAuley et al., 2009; McAuley, Jerome, Elavsky, Marquez, & Ramsey, 2003; Rejeski et al., 2003; Steptoe, Rink, & Kerry, 2000). This literature suggests that individual beliefs and perceptions about exercise are consistent determinants of exercise adoption and maintenance.

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Many of these studies, guided by Bandura's social cognitive theory (Bandura, 1986, 1997), have repeatedly shown significant effects of self-efficacy on physical activity. However, social cognitive theory specifies that there are two types of expectations: self-efficacy and outcome expectations. Self-efficacy expectations are individuals' beliefs in their ability to complete a specific action or behavior. Outcome expectations are individuals' beliefs that engaging in a certain behavior will result in a desired outcome. In the context of physical activity, outcome expectations refer to individual beliefs that engaging in physical activity will lead to certain benefits (e.g., weight loss, improved muscle strength). Although both self-efficacy and outcome expectations have been identified as determinants of physical activity adoption and maintenance (McAuley et al., 2003; Resnick, 2001a; Resnick & Nigg, 2003; Shaughnessy, Resnick, & Macko, 2006; Wilcox, Castro, & King, 2006; Williams, Anderson, & Winett, 2005), fewer studies have examined outcome expectations in older adults.

To examine the impact of outcome expectations on exercise behavior, it is essential that a valid and reliable measure be developed and used. The Outcome Expectations for Exercise Scale was developed by Resnick, Zimmerman, Orwig, Furstenberg, and Magaziner (2000) for use in older adults and remains the most-often-cited outcome-expectations measure in physical activity studies with older adults. Briefly, this measure includes nine items reflective of various physical and mental health benefits of exercise participation. Individual responses are summed across all items to arrive at a single outcome-expectations score. This unidimensional structure is inconsistent with Bandura's conceptualization of physical, social, and self-evaluative dimensions of outcome expectations. Physical outcome expectations reflect individual beliefs about the pleasant physical experiences that result from participating in physical activity (e.g., weight loss). Social outcome expectations reflect the beliefs about the social reaction of others that results from participating in physical activity (e.g., companionship). Self-evaluative outcome expectations reflect individual beliefs about the extent to which participating in physical activity influences feelings of satisfaction and self-worth (e.g., personal accomplishments). Bandura has clearly and consistently noted that these three domains are related but conceptually distinct.

The purpose of the current study was to examine the psychometric properties of a newly developed multidimensional measure of outcome expectations for exercise in a sample of older adults with functional impairment residing in continuing-care retirement communities. The Multidimensional Outcome Expectations for Exercise Scale (MOEES) was developed by Wójcicki, White, and McAuley (2009) and includes three subscales reflective of Bandura's subdomains of outcome expectations: physical, social, and self-evaluative. To date, the validity of the MOEES has only been demonstrated in community-dwelling adults (Wójcicki et al., 2009) and adults with multiple sclerosis (McAuley, Motl, White, & Wójcicki, 2010). Examining this measure and its subscales in older adults is necessary to better understand the specific factors that may influence physical activity participation in this sample. Older adults are a heterogeneous group, characterized by a range of physical, social, and functional capabilities. As such, certain types of outcome expectations for exercise may be more salient across populations and conditions. As noted, there is empirical evidence to suggest that outcome expectations have an important role in older adults' exercise participation. However, with the exception of one study conducted by Resnick (2001a), these studies were conducted in relatively high-functioning, community-dwelling older adults. Therefore, we tested the MOEES in a sample of older adults with significant functional impairment—older adults living in continuing-care retirement communities. This sample was drawn from a larger study examining physical activity and mobility disability in older adults living in continuing-care retirement communities (Hall & McAuley, 2011).

In addition to examining the psychometric properties of the MOEES, we sought to examine the validity of the MOEES using other theoretically relevant factors including physical activity and self-efficacy. Specifically, we examined the associations between outcome expectations and balance self-efficacy. Consistent with previous research and a social cognitive perspective, we hypothesized that stronger outcome expectations would be significantly and positively associated with higher levels of leisure-time physical activity and stronger self-efficacy. Our decision to measure self-efficacy specific to balance was driven by the realization that all of these older adults were functionally limited in some way, largely in the area of mobility (Hall & McAuley, 2011), and as such, this form of self-efficacy was best suited to the population being studied.

Finally, it has been demonstrated repeatedly that functional impairment and poor health status (e.g., chronic conditions) have a significant negative effect on physical activity participation among older adults. Studies that examine these relationships in concert with self-perception factors conclude that self-efficacy perceptions play an important role in this relationship (McAuley et al., 2009; McAuley et al., 2007), such that greater impairment is associated with lower self-efficacy, which, in turn, results in lower rates of physical activity. The role of outcome expectations as they relate to functional ability and health status is less developed. Previous works (Ferrier, Dunlop, & Blanchard, 2010; Resnick, 2001a, 2001b; Shaughnessy et al., 2006) report mixed results ranging from nonsignificant to weak negative associations between outcome expectations and functional status, as well as chronic illnesses.

To date, the association between outcome expectations and indicators of physical and functional health remain to be examined in older adults residing in continuing-care retirement communities. Given the importance of outcome expectations on physical activity adoption (McAuley et al., 2009; Wilcox et al., 2006; Williams et al., 2005), understanding the relationship between physical and functional health and perceived outcomes of exercise could prove useful for designing more effective physical activity programs and behavioral interventions. We hypothesized that physical outcome expectations would have a stronger association with functional performance and health status (e.g., number of chronic conditions) than social or self-evaluative outcome expectations.

Methods

Study Participants and Recruitment Procedures

One hundred eight older adults were recruited to participate in this study. Details of recruitment and data-collection methods for the original sample have been published in detail elsewhere (Hall & McAuley, 2011). Briefly, older adults residing in rural continuing-care retirement communities located in the Midwestern region of the United States were contacted to provide initial consent for the distribution of the flyers to residents. Participants were recruited from 13 facilities. A recruitment orientation session was held at each site, during which the purpose of the study was presented, along with inclusion and testing procedures. Recruitment strategies were identical at each site (Hall & McAuley, 2011). Initial screening criteria required all participants to be at least 65 years of age and pass a basic cognitive screening task (Pfeiffer, 1975). All study procedures were approved by the university institutional review board, and each participant completed a written informed consent before study entry.

Measures

Outcome Expectations. Outcome expectations for exercise were measured using the MOEES (Wójcicki et al., 2009). This 15-item scale includes six items assessing physical outcome expectations, four items assessing social outcome expectations, and five items assessing self-evaluative outcome expectations. Using a 5-point Likert scale (1 = *strongly disagree,* 5 = *strongly agree*), participants were asked to rate how strongly they agreed with each of the 15 items in the context of regular exercise or physical activity. Example items include "Exercise will improve my ability to perform daily activities" (physical), "Exercise will let me have contact with friends and persons that I enjoy" (social), and "Exercise will help me manage stress" (self-evaluative). Higher scores indicate stronger and more positive outcome expectations for exercise.

Physical Activity. Physical activity was measured by ActiGraph accelerometers (model 7165, Pensacola, FL). The ActiGraph accelerometer is a small device that measures movement and provides information about the total amount, frequency, intensity, and duration of physical activity over a specified time interval (Westerterp, 2009). The output from an accelerometer is in the unit of counts, which reflect the intensity of movement (acceleration) recorded. In this study, activity counts were recorded across 60-s intervals during a 7-day period. Study participants were instructed to wear the monitor on an elastic belt around the waist during all waking hours (with the exception of water-based activities such as bathing). This placement of the accelerometer around the waist allowed us to capture mobility-related activity. The minimum period of valid monitoring to be included in data analysis was 5 days, which is required to achieve 80% reliability (Matthews, Ainsworth, Thompson, & Bassett, 2002). Activity counts were summed and averaged across the total number of days the accelerometer was worn to provide a measure of average total daily activity.

Balance Self-Efficacy. Balance self-efficacy was assessed with the Activity-specific Balance Confidence Scale (Powell & Myers, 1995). Based on social cognitive theory, this 16-item scale asks participants to rate their confidence to execute activities of daily living without losing their balance. Example items include "walking up and down a ramp" and "bending over to pick up an object from the floor." The scale is a 100-point percentage scale, ranging from 0% (*not at all confident*) to 100% (*highly confident*), and demonstrated excellent internal consistency in this sample ($\alpha = .95$).

Number of Chronic Conditions. Number of comorbidities was determined via self-report by asking participants to indicate which, if any, conditions they currently suffered from, referencing a list of 17 medical conditions that we have used in previous studies (McAuley, Konopack, Motl, Rosengren, & Morris, 2005). Conditions surveyed include cardiovascular disease, significant disorders of heart rhythm, peripheral vascular disease, central nervous system disorders or residuals, pulmonary disease, functional impairment of the musculoskeletal system, hypertension, hyperlipidemia, diabetes, anemia or bleeding disorder, phlebitis or emboli, cancer, emotional disorders, ulcers, edema, infectious disease, and hearing loss. Responses to the individual items were summed to arrive at a total number of chronic conditions.

Functional Performance. Lower extremity functional performance was assessed using the Short Physical Performance Battery (Guralnik, Ferrucci, Simonsick, Salive, & Wallace, 1995; Guralnik et al., 1994), a test that measures standing balance, gait speed, and chair-stand ability. Static balance is assessed by an individual's ability to maintain balance in three progressively challenging standing positions for up to 10 s (feet together, semitandem, and tandem postures). Gait speed is measured as the time to walk 4 m at a normal walking pace. The chair-stand test measures the time to complete five chair stands as quickly as possible. Individual performance on each test is rated from 0 to 4, with 4 indicating the highest level of performance and 0 the inability to complete the test. The overall physical-performance score combined the results of the gait speed, chair-stands, and balance tests, with scores ranging from 0 to 12. Higher scores correspond to better performance.

Procedures

All functional-performance measures were completed on-site at each individual facility, while self-report measures were completed via questionnaires mailed to participants. During the initial recruitment orientation session, participants who qualified for the study were asked to complete an informed-consent document approved by a university institutional review board, along with questionnaires including demographic and general health-status information. Each participant was then fitted with an accelerometer and instructed on how and when to wear it during the following 7-day assessment period. Participants were mailed the balance-self-efficacy and MOEES questionnaires and asked to bring the completed packet with them to their scheduled follow-up session. At the follow-up testing session, the activity monitor and questionnaires were collected and each participant performed the Short Physical Performance Battery. Participants were paid $30 for their participation.

Data Analysis

Confirmatory Factor Analysis. A confirmatory factor analysis (CFA) was conducted to test the factorial validity of the 15-item, three-factor model of outcome expectations proposed by Wójcicki et al. (2009). Mplus V5.21 structural-equation-modeling software (Muthén & Muthén, 2007) was used for these analyses.

Model Fit. The fit of the model was tested with several standard goodness-of-fit criteria: the chi-square statistic, root-mean-square error of approximation (RMSEA), and comparative-fit index (CFI; Hu & Bentler, 1999; Jöreskog & Sörbom, 1996). RMSEA reflects the amount of information that is not accounted for by the model. The RMSEA can range from 0 to 1. Values for the RMSEA of .06 or less are indicative of good model fit (Browne & Cudeck, 1993; Hu & Bentler, 1999). Similar to RMSEA, the CFI can range from 0 to 1. CFI values of .95 or greater indicate a good model–data fit (Bentler, 1990; Hu & Bentler, 1999).

In light of our relatively small sample size ($N < 250$) we followed Hair, Black, Babin, and Anderson's (2009) guidelines that such models be subject to more strict evaluation than more complex models with larger samples. Consistent with their recommendations, we used a CFI of ≥.97 and an RMSEA <.06 as criteria for determining good model–data fit. The standardized residuals and model-modification indices were also examined to identify possible areas for model modification.

The process of psychometric evaluation also involves testing the reliability of the measure (here, the MOEES subscales), as well as assessing the quality of the individual items. All of this is information is generated during the CFA. The contribution (e.g., importance) of each individual item is determined by examining the factor loadings (λ). Factor loadings indicate how much of the variance in that single item is explained by the factor. For example, if the factor loading for the MOEES item "Exercise will increase my strength" is .67, this means that 67% of the variance in this item is accounted for by the variance in the physical-outcome-expectations subscale of the MOEES; the remaining 33% of the variance cannot be accounted for and is attributed to error. It is recommended that factor loadings be.5 or higher, such that at least 50% of the variance is explained by the factor (i.e., the corresponding MOEES subscale).

Validity. We examined relationships between the three types of outcome expectations and other constructs in accordance with social cognitive theory (Bandura, 1986, 1997). First, we examined theoretical associations between outcome expectations and both self-efficacy and physical activity using bivariate correlations. Next, we conducted correlation analyses to determine whether the three types of outcome expectations were differentially associated with functional performance and health status (as evidenced by correlation coefficients that differed in strength and/or direction across the three types of outcome expectations for a given variable). Data were analyzed using PASW Statistics 18, release version 18 (SPSS Inc., 2009, Chicago, IL).

Results

Participant Characteristics

Sample characteristics have been reported previously (Hall & McAuley, 2011) and are summarized in Table 1. A total of 108 older adults (*M* age 85.4 years) completed all study measures. Participants were primarily White, female, and overweight. As stated previously, these older adults were recruited from continuing-care retirement communities, with most living in assisted-living residences.

CFA

The CFA of the MOEES found that the original three-factor structure fit the data poorly in this sample of older adults ($\chi^2_{87} = 182.63$, $p < .001$, RMSEA [95% CI]

Table 1 Sample Characteristics

Variable	Value
Age (years), *M* ± *SD,* range	85.4 ± 6.5, 68–99
White race	98.1%
Gender	
male	25%
female	75%
Body-mass index, *M* ± *SD,* range	26.1 ± 4.7, 17.5–38.7
Residence type	
independent-living facility	63.0%
assisted-living facility	35.2%

= .10 [.08–.12], CFI = .87). Further inspection of the model output showed three items with factor loadings <.50; the accepted criterion established for moderate to strong associations. The three items and their factor loadings include "Exercise will aid in weight control" ($\lambda = .43$), "Exercise will provide companionship" ($\lambda = .42$), and "Exercise will improve my mood" ($\lambda = .37$). After the deletion of these items, we conducted a subsequent CFA on the remaining 12 items (five physical, three social, and four self-evaluative). This resulted in an excellent fit to the data (χ^2_{51} = 68.54, $p = .05$, RMSEA [95% CI] = .06 [.00–.09], CFI = .97). Correlations between the three factors were significant ($p < .001$) and moderate to large in magnitude (physical/social, $r = .67$; physical/self-evaluative, $r = .95$; social/self-evaluative, $r = .76$). All scale items and their standardized factor loadings are shown in Table 2.

Internal Consistency and Validity of the MOEES

The internal consistency of the three outcome-expectations scales was adequate (i.e., physical $\alpha = .75$, social $\alpha = .82$, self-evaluative $\alpha = .84$). Table 3 shows the mean values for each of the MOEES subscales and all other study measures. As can be seen, these older adults had very positive physical and self-evaluative beliefs about exercise and moderately positive beliefs about the social benefits of exercise.

Study participants were active at a level of ~73,000 counts/day, indicating very low levels of activity. The activity levels in this study are consistent with other reports in mobility-limited older adults (Bergman, Bassett, Muthukrishnan, & Klein, 2008; Pruitt et al., 2008). Although this sample was moderately confident in their ability to complete various activities of daily living without losing their balance, their actual physical-performance scores were quite low, indicative of restricted functional ability.

Bivariate correlations indicated that higher levels of activity were significantly associated with stronger physical ($r = .30$, $p < .01$) and self-evaluative outcome expectations ($r = .21$, $p < .05$) but not with social outcome expectations ($r = .04$, $p = .69$). Higher self-efficacy was significantly associated with physical ($r = .41$, $p < .001$) and self-evaluative ($r = .25$, $p < .05$) outcome expectations but not with social outcome expectations ($r = .16$, $p = .10$).

Table 2 Multidimensional Outcome Expectations for Exercise Scale Items and Confirmatory Factor Loadings

Item	Factor loading
Physical outcome expectations	
Exercise will improve my ability to perform daily activities.	.60
Exercise will improve my overall body functioning.	.51
Exercise will strengthen my bones.	.64
Exercise will increase my muscle strength.	.83
Exercise will improve the functioning of my cardiovascular system.	.67
Social outcome expectations	
Exercise will improve my social standing.	.71
Exercise will make me more at ease with people.	.84
Exercise will increase my acceptance by others.	.78
Self-evaluative outcome expectations	
Exercise will help manage stress.	.68
Exercise will improve my psychological state.	.74
Exercise will increase my mental alertness.	.84
Exercise will give me a sense of personal accomplishment.	.78

Note. All loadings significant ($p < .001$) and standardized.

Table 3 Descriptive Statistics for All Study Variables

Variable	*M* (*SD*)	Possible range
Physical outcome expectations	20.5 (2.8)	5.0–25.0
Social outcome expectations	10.6 (2.0)	3.0–15.0
Self-evaluative outcome expectations	15.8 (2.4)	4.0–20.0
Physical activity[a]	73,301 (4,016)	N/A
Self-efficacy for balance[a]	52.7 (25.5)	0.0–100.0
Functional performance[a]	5.4 (2.5)	0.0–12.0
Number of chronic conditions[a]	3.2 (1.9)	0.0–17.0

[a]Previously reported in Hall & McAuley (2011).

The next set of correlation analyses examined the extent to which the three outcome-expectation scales were differentially related to functional performance and health status. As hypothesized, physical outcome expectations were more strongly associated with functional performance ($r = .37$, $p < .01$) than either social ($r = .01$, $p = .33$) or self-evaluative ($r = .25$, $p < .01$) expectations were. Contrary to our hypothesis, outcome expectations were unrelated to number of chronic conditions ($r = –.05$ to $–.07$).

Discussion

The current study sought to validate the MOEES, a recently developed measure of outcome expectations for exercise in a sample of older adults with functional impairment. Similar to the original development and validation study, our CFAs provided good support for the independent assessment of the physical, social, and self-evaluative outcome expectations for exercise. However, they indicated that three items from the original MOEES did not load significantly on their respective constructs. On removal of these three items, the model fit was significantly improved, providing an excellent fit to the data. However, it is recommended that these items be retained pending additional validity and factorial-invariance testing in other samples and over time.

Similar to earlier validation studies of the MOEES (McAuley et al., 2010; Wójcicki et al., 2009), we only observed moderate ratings on the social outcome-expectation scale, suggesting that these older adults do not expect much benefit in the realm of social networks from physical activity participation. However, participants reported moderately high ratings on the physical and self-evaluative outcome-expectation scales, indicating they believe that regular physical activity participation can improve physical and self-evaluative outcomes. The extent to which these outcome expectations for exercise are realistic, given the physical and functional limitations of this sample, warrants further consideration. Indeed, Bandura (1997) has noted that while positive outcome expectations can serve to motivate, unrealistic outcome expectations can be detrimental to behavior maintenance when the expected benefits are not realized or do not occur in the expected time frame. Previous work by Wilcox et al. (2006) demonstrated the undermining effect that high outcome expectations at the outset of a program can have on physical activity maintenance in older women if the expectations are not realized.

Our validation analyses examining relationships among outcome expectations and theoretically relevant variables also provide evidence to support the psychometric properties of the MOEES. Consistent with a social cognitive perspective (Bandura, 1986, 1997) and previous research (Ferrier et al., 2010; McAuley et al., 2009; Resnick, 2001a, 2001b; Wilcox et al., 2006; Williams et al., 2005), more active individuals, as well as more efficacious individuals, reported higher expectations for positive outcomes relative to exercise participation. In this sample, however, it was physical and self-evaluative outcome expectations that demonstrated significant associations with both of these variables.

The lack of effect observed for social outcome expectations, reflective of meeting new people, social status, and being with friends, may be a function of where these older adults live. Indeed, in continuing-care retirement communities, where the breadth and depth of social networks is limited to other residents, such outcomes may not be expected or may not be a motivating factor for physical activity participation. Work by Carstensen (1992) and other gerontologists emphasizes this latter point further, suggesting that older adults are unlikely to look for casual friends in this sort of context, as rates of social interaction decline in old age and selection of social contacts becomes more selective. As such, potential opportunities for social interaction may not be a major focus for older adults. Further investigation of this pattern of results is warranted in other non-community-dwelling samples.

These analyses further suggest that the three outcome-expectation scales were differentially related to functional performance, such that individuals with better functional performance reported higher physical outcome expectations for physical activity than social or self-evaluative outcome expectations. Contrary to our expectations, number of chronic conditions, used here as an indicator of health status, demonstrated no significant associations with any of the three types of outcome expectations. Some cross-sectional studies have found that outcome expectations are negatively, albeit weakly, associated with health status (Resnick, 2001a, 2001b), and other studies have found no cross-sectional associations between outcome expectations and health status (McAuley et al., 2010). The lack of any significant associations between the MOEES subscales and health status may be due to the relative homogeneity of the sample in terms of comorbidity status. Indeed, 80% of our sample had multiple chronic conditions. A more diverse sample is recommended for future validation studies.

It is important to consider several limitations of this study, including the relatively small sample size, when interpreting the findings. Our study is limited by the cross-sectional nature of the data and the specificity of our sample, which consists predominantly of older White women who live in residential-care facilities. However, our recruitment of older adults in the later decades of life who have broad functional-status profiles is a strength of this study, as is our use of objective assessments of physical activity and functional performance. We recognize that this sample may not be generalizable to the larger population of community-dwelling older adults. However, given that the primary aim of this study was to validate the factor structure of the MOEES in a sample of non-community-dwelling older adults with functional impairments, our approach may be appropriate. Further cross-validation studies that employ longitudinal designs and examine the three-factor model structure in other populations are needed. Finally, we did not attempt to examine the role of outcome expectations in a comprehensive model of physical activity behavior change. Such an endeavor is beyond the scope of these data. However, we do recognize the importance of testing these theoretical relationships over time to better understand what factors influence outcome expectations and how changes in outcome expectations modify behavior over time. For such models, it may be preferable to use a self-efficacy measure that more closely matches the behavioral outcome of interest (i.e., exercise self-efficacy, barriers self-efficacy).

Despite these limitations, our study provides novel and important information about what older adults with multiple morbidities perceive as benefits associated with being physically active, whether these benefits differ by physical function, and which outcome expectations may play a key role in determining physical activity behavior. The study provides further support for the psychometric properties of the MOEES in a sample of the "oldest old" and highlights the importance of considering outcome expectations alongside other self-perception variables in the development and implementation of physical activity interventions for sedentary older adults with functional limitations. The high ratings on the physical and self-evaluative outcome-expectation scales suggest that these older adults believed they would benefit by engaging in regular physical activity. In light of our findings here, future physical activity interventions targeting older adults in continuing-care retirement communities might be best served by advertising the potential benefits, particularly in the physical and self-evaluative domains, associated with engaging in regular physical activity as a strategy for encouraging exercise adoption. Future work building on the findings here is needed to identify and develop evidence-based recommendations for promoting physical activity and ultimately improving the health and well-being of older adults.

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