ARE TEAM SPORT GAMES MORE MOTIVATING THAN INDIVIDUAL EXERCISE FOR MIDDLE-AGED WOMEN? A COMPARISON OF LEVELS OF MOTIVATION ASSOCIATED WITH PARTICIPATING IN FLOORBALL AND SPINNING

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Abstract:

The aim of this study was to investigate the levels of motivation associated with the participation in floorball (indoor hockey) and spinning, and how these levels of motivation predicted continuation. A sample of 66 middle-aged women participated in a 12-week intervention of either floorball or spinning. They filled out the *Sport Motivation Scale* in week 2 and week 11 of the intervention, and data was also collected on their continuation six and 12 months after the intervention. A repeated measures MANOVA showed that participants in the floorball group had higher levels of intrinsic and self-determined extrinsic motivation for the activity during the intervention period, suggesting that floorball is a more motivating activity. In addition, the introjected regulation extrinsic motivation increased in both groups during the intervention period. Intrinsic motivation, as well as extrinsic motivation introjected regulation, predicted participants' continuation six and 12 months after the intervention, suggesting that motivation as viewed in a Self-Determination Theory perspective is important for exercise continuation.

Key words: *exercise, fitness, motivation, psychology, team sport*

Introduction

Middle-aged women struggle with adhering to physical activity (Arikawa, O'Dougherty, & Schmitz, 2011), and cannot profit from its health benefits. Therefore, attempts to support physical activity continuation among middle-aged women should be made.

An essential factor for the regular upkeep of physical activity is motivation and a theory applied to investigate the motivation for physical activity is the Self-Determination Theory (SDT; Deci & Ryan, 1985). It has predicted participation in physical activity (Pelletier, Fortier, Vallerand, & Briére, 2001; Ryan & Deci, 2007). SDT assumes that human beings have three basic psychological needs that must be satisfied for an individual to thrive (Deci & Ryan, 2000; Deci & Vansteenkiste, 2004), namely feelings of *autonomy*, *competence*, and *relatedness to others*. Healthy individuals are inclined to engage in activities in which their basic needs are satisfied. The motivation for such activities is called *intrinsic motivation* (Deci & Ryan, 1985; Ryan & Deci, 2000; Vallerand, 2000). An individual whose basic psychological needs are immediately satisfied from partaking in a certain activity will feel well-being and thriving, and will be intrinsically motivated to return to the activity. This means that he/she engages in the activity for the sake of the activity itself (Ryan & Deci, 2000; Vallerand, 2000).

The other major form of motivation in SDT is extrinsic motivation (EM). An extrinsically motivated individual engages in an activity to attain positive consequences that follow that activity, such as exercising for improved health, social approval, or to avoid the negative consequences of not participating in the activity, such as feelings of guilt or poorer health. The individual does not engage in the activity for the imminent satisfaction of basic needs but for longer term satisfaction of basic needs or other positive outcomes associated with the activity. SDT operates with four forms of EM that differ in their form of regulation (Wilson, Rodgers, Loitz, & Scime, 2006). They range from self-determined to highly controlled, with the most self-determined first: EM integrated regulation, EM

identified regulation, EM introjected regulation and EM external regulation (for a full description of the forms of extrinsic motivation, see Deci & Ryan, 1985). Lastly, SDT operates with *amotivation*, a term which reflects the absence of both intrinsic and extrinsic motivation (Wilson, et al.).

Research has indicated that continuation of an activity is associated with the more self-determined forms of motivation: intrinsic motivation (e.g., Moller, Buscemi, McFadden, Hedeker, & Spring, 2013; Nielsen, et al., 2014; Ntoumanis, 2005; Ryan & Deci, 2007), as well as with the forms of EM integrated regulation (e.g., Wilson, et al., 2006) and EM identified regulation (e.g., Wilson, Sabiston, Mack, & Blanchard, 2012). To facilitate continuation in physical activity, it therefore seems prudent to investigate the amount of motivation connected to different physical activities.

The motivation for an activity can depend on the extent to which the activity satisfies the three basic psychological needs. In a recent study, it was investigated how middle-aged male participants were motivated for team sports and individual exercise (Nielsen, et al., 2014). The researchers found the team game football to be more intrinsically motivating than the individual fitness activities crossfit and spinning. Playing football seemed to give the participants more positive experiences of interaction during the activity, therefore giving more possibilities to satisfy the need for relatedness. It was also found that the technically focused nature of football offered more opportunities for the participants to experience feelings of competence than the fitness training (Nielsen, et al., 2014).

Research on whether the motivational effects of team sport interventions are similar for middle-aged women, however, is lacking. Therefore, the aim of this study was to investigate whether an exercise program involving a team game elicits more motivation, especially self-determined motivation, than an intervention involving individual exercise conducted in group training for middle-aged women, both with regard to overall motivation during the intervention period and motivation development over time. The second aim of the study was to investigate if this higher motivation was related to continuation in regular physical activity after the intervention programs had ended.

It was expected that participants in a team game would score overall higher on the self-determined forms of motivation, intrinsic motivation and EM identified regulation, than the participants in an individual physical activity (Nielsen, et al., 2014; Wilson, et al., 2006). No group differences in EM introjected regulation and external regulation were expected. As the study was novel, no hypotheses with regard to development in motivation over time nor with regard to group differences in development of motivation over time were formulated. Turning to the association between motivation and continuation after the intervention, it was expected that the self-determined forms of motivation, intrinsic motivation and EM identified regulation, would predict continuation positively (Nielsen, et al., 2014; Wilson, et al., 2006). Furthermore, it was expected that EM introjected regulation would predict continuation positively (Hartmann, Dohle, & Siegrist, 2015). It was not expected that EM external regulation would affect continuation.

Methods

This study investigated the research questions by using samples from two separate studies with the aim of investigating the effects of floorball and spinning, respectively, on participants' cardiovascular and musculoskeletal health; the details as well as the results of studies are reported elsewhere (Mandrup, et al., 2017; Nyberg, et al., 2014). The studies were approved by the Ethics Committee of Copenhagen and Frederiksberg communities Region H (H-1-2012-150) and conducted in accordance with the guidelines of the Declaration of Helsinki.

Recruitment and participants

For the floorball and the spinning programs, 66 women aged 44-56 years were recruited to participate through newspaper ads describing these activities and the research involved. As the participants were from two different studies, the two activities were advertised separately at different times. All the participants had been physically inactive for at least a year (less than one hour of moderate physical activity per week). Thirty-five women were recruited for two floorball groups and 31 women were recruited for two spinning groups. Twelve women did not attend the first or last two weeks of training, making them ineligible for either the week 2 or the week 11 data gathering, and two were excluded due to injuries. Furthermore, five participants (three floorball and two spinning) had missing answers in at least one subscale, and were excluded. Thus, 23 women in the floorball (age=50.61 years, SD=3.53) and 24 in the spinning (age=50.33 years, SD=3.12) group were included in the analysis.

Intervention procedure

Floorball (indoor hockey) was chosen as a team sport game because it involved high levels of interaction, mutual dependency, technical challenges, and intensity, but is in the Danish context tied to fewer expectations and may be perceived as more appealing than football by inactive women. Spinning (fitness cycling on stationary bikes) was chosen as an individual exercise, as this is a common form of individual exercise for middle-aged women in Denmark (Laub & Pilgaard, 2013). Both the floorball and the spinning interventions were supervised

and lasted 12 weeks. This intervention length and training frequency is sufficient to produce health benefits for the participants (Nyberg, et al, 2014). The floorball training sessions entailed 30 min of technical training exercises, including warm-up, followed by 30 min of floorball play 3 against 3 on a 12m x 20m court, in 4-6 min intervals separated by 1-3 min of recovery. The women participated in the floorball training sessions two times per week, in a gym at the research facility. The spinning training sessions consisted of warm-up, 4-6 blocks of varying intensity of 6-10 minutes spinning, with 1-2 min break between each block. The women participated in the spinning sessions three times per week, two of which were in a gym at the research facility, and one was conducted on their own in a local fitness centre. Both training interventions were led and organized by physical education graduates from the department.

Measurements

A Danish version of the *Sport Motivation Scale* (SMS; Pelletier, et al., 1995) was used to measure motivation. The SMS measures three forms of intrinsic motivation, namely: to accomplish, to experience stimulation, and to know, three forms of extrinsic motivation, namely: identified, introjected and external regulation, and amotivation. Total intrinsic motivation was measured as an average of the three intrinsic motivation subscales. Each of these subscales were measured by four items, totalling in 28 items in the questionnaire and using a Likert-scale answering format from 1="Does not correspond at all" to 7="Corresponds exactly". Each item is a reply to the question "What is appealing to you in floorball/spinning?", and examples of item wordings were "For the pleasure of discovering new training techniques" (intrinsic motivation to know), "Because I must do sports to feel good about myself" (EM introjected regulation), and "It is not clear to me anymore. I don't really think my place is in sport" (amotivation). The Danish version of the SMS was developed prior to this study using the translation and back-translation method, in which three experts on motivation, also fluent in both Danish and English, participated (Brislin, 1970). The original version of the SMS was used, as a newer version, the SMS-II, was not yet available at the time of the study (Pelletier, Rocchi, Vallerand, Deci, & Ryan, 2013). The three subscales of intrinsic motivation were combined to a total intrinsic motivation score, because there were no specific hypotheses regarding different forms of intrinsic motivation, and because intrinsic motivation can be viewed as only one form of motivation in the SDT framework. The SMS was distributed to the participants in week two of the intervention, because the participants needed to have some experience with the activity prior to measuring their motivation for it, and in intervention week 11 in order to avoid that the approaching end of the intervention could affect participant answers. When calculating the SMS subscales, a mean of the four items belonging to a particular scale was calculated.

To investigate continuation, each participant was contacted and asked if she was still doing the intervention exercise (either floorball or spinning) six and 12 months after the intervention had ended, with the questions: "Were you still exercising 6/12 months after the intervention had ended?". The duration of six and 12 months was chosen because this would secure that the participants had gone through one or two periods of vacation, which could potentially disrupt continuation. Furthermore, since team games and individual exercise pose very different external practical barriers and opportunities for individual continuation after the intervention (Nielsen, et al., 2014), it was decided to control for this. This was done by creating a binary variable denoting whether the participants reported practical barriers as the reason for their discontinuation and including this in the analysis. If the participants indicated that they did not continue to do exercises, the discontinuation due to external practical barriers, such as lack of time or large distance to the place where they trained, was identified using the question: "What was the reason for discontinuation?". Whether the answers indicated external practical barriers was assessed by the first three authors, and if there was any disagreement, the answer was not noted as due to an external practical barrier.

Statistical analysis

Statistical analysis was conducted by SPSS 23.

Reliability of the intrinsic motivation scales, the three extrinsic motivation subscales and amotivation scale were analysed using Cronbach's alpha. A value of .70 was regarded as an acceptable value (Ponterotto & Ruckdeschel, 2007). However, Cronbach's alpha is affected by sample size and number of items (Field, 2013). The sample size for the analyses was 52 participants and the number of items was only four for each of the subscales, possibly deflating the Cronbach's alpha values. To ensure that subscales were not discarded due to this deflation, a second reliability test was performed, the item-total correlation test, for the subscales that did not meet cut-off criteria of .70. A correlation coefficient of .20 was set as a threshold for acceptable values (Streiner & Norman, 2008).

To test the differences between the two groups in both the overall levels of motivation for the activity and in development of motivation from week 2 to 11, effects of group and time on motivation levels were tested with a repeated measures mixed MANOVA, in which intrinsic motivation and

the three subscales of extrinsic motivation were the dependent variables.

To test if motivation had affected continuation, four logistic regression analyses were performed, in which continuation after either six or 12 months was used as the dependent variable, and each form of motivation was used as the independent one. Motivation over the intervention period was calculated as a mean between the week 2 and week 11 values. For the participants with only one measurement point, only one value was used (n=15). In all logistic regression analyses, the participants were excluded (n=4) who reported injury as a reason for discontinuation after the intervention had ended. To control for practical barriers for the continuation, the binary variable denoting whether the participants had discontinued due to practical barriers was included as a covariate in the logistic regressions. Because several previous studies have shown motivation to predict continuation, one-tailed tests were used to test this hypothesis.

Results

Reliability of the week 2 and week 11 scale of intrinsic motivation (.93 and .95), total extrinsic motivation (.82 and .86), and EM external regulation (.76 and .78) was acceptable, whereas it was not acceptable for EM identified regulation (.57 and .81), EM introjected regulation (.61 and .55) and amotivation (.37 and .48). Therefore, these three subscales were analysed using the item-total correlation test.

All item-total correlations for the items in EM introjected regulation (.42, .47, .26, .29 for week 2 and .69, .65, .47, .71 for week 11) and EM external regulation (.37, .46, .47, .32 for week 2 and .21, .47, .39, .37 for week 11) were above acceptable values, and it was therefore decided to continue with the analysis of these subscales. However, two of item-total correlation values for the items in amotivation (-.05, .40, .47, .15 in week 2 and .26, .24, .40, .24 in week 11) were below the acceptable value of .20, and therefore this subscale was discarded.

Descriptive statistics for the motivation variables can be seen in Table 1.

A significant main effect for group was found for total intrinsic motivation (Table 2). The women participating in floorball had higher scores of intrinsic motivation during the intervention period than the spinning group. The effect size was small to medium (Richardson, 2011).

Significant main effects for group were also found for EM identified regulation, but not for EM external regulation. The floorball participants had higher scores in total extrinsic motivation and EM identified during the intervention period. In addition, the p-value for introjected regulation was .050, and given the small sample size, this deserves mentioning. Effect sizes for these findings were small.

The interaction between group and time revealed that the two groups did not significantly differ in motivation development (Table 3).

When testing for an overall difference/change in motivation from week 2 to week 11, the only significant main effects for time was for EM introjected regulation (Table 4). Both groups increased their scores in EM introjected from week 2 to week 11. The effect size was small.

Intrinsic motivation significantly predicted continuation six and 12 months after the intervention in both groups (Table 5). Furthermore, EM introjected regulation also predicted continuation. It seems that the more motivated the participants were,

Table 1. Motivation scores for floorball and spinning groups at week 2 and 11

		Floorball		Spinning	
		Week 2	Week 11	Week 2	Week 11
Intrinsic motivation	Total	4.51 (0.89)	4.66 (0.97)	3.48 (1.15)	3.55 (1.25)
Extrinsic motivation	Identified regulation	3.29 (0.95)	3.24 (1.45)	2.52 (0.94)	2.57 (1.16)
Extrinsic motivation	Introjected regulation	4.47 (0.94)	4.67 (0.89)	3.89 (0.94)	4.27 (0.98)
Extrinsic motivation	External regulation	1.96 (1.52)	2.22 (1.33)	1.56 (1.00)	1.70 (1.21)

Note. Motivation scores are presented as mean (SD).

Table 2. Repeated measures MANOVA main group effects

		N	F (df; dfR)	p	Partial η^2
Intrinsic motivation	Total	47	16.27 (1; 45)	.000	.24
Extrinsic motivation	Identified regulation	47	6.70 (1 ;45)	.013	.13
Extrinsic motivation	Introjected regulation	47	4.04 (1; 45)	.050	.08
Extrinsic motivation	External regulation	47	1.73 (1; 45)	.195	.04

*Table 3. Repeated measures MANOVA group*time interaction effects*

		N	F (df; dfR)	p	Partial η^2
Intrinsic motivation	Total	47	0.09 (1; 45)	.771	.00
Extrinsic motivation	Identified regulation	47	0.08 (1; 45)	.774	.00
Extrinsic motivation	Introjected regulation	47	0.52 (1; 45)	.473	.01
Extrinsic motivation	External regulation	47	0.22 (1; 45)	.643	.01

Table 4. Repeated measures MANOVA main time effects

		N	F (df; dfR)	p	Partial η^2
Intrinsic motivation	Total	47	0.63 (1; 45)	.430	.01
Extrinsic motivation	Identified regulation	47	0.00 (1; 45)	.995	.00
Extrinsic motivation	Introjected regulation	47	5.73 (1; 45)	.021	.11
Extrinsic motivation	External regulation	47	2.17 (1; 45)	.147	.05

Table 5. Logistic regression analyses of group and motivation effects on continuation after six and twelve months

Six months		B (S.E.)	Odds ratio	p
Intrinsic motivation	Total	0.48 (0.26)	1.61	.033
Extrinsic motivation	Identified regulation	0.35 (0.29)	1.41	.115
Extrinsic motivation	Introjected regulation	0.60 (0.30)	1.83	.024
Extrinsic motivation	External regulation	0.32 (0.26)	1.38	.105
Twelve months		B (S.E.)	Odds ratio	p
Intrinsic motivation	Total	0.48 (0.26)	1.61	.035
Extrinsic motivation	Identified regulation	0.31 (0.28)	1.37	.134
Extrinsic motivation	Introjected regulation	0.57 (0.30)	1.78	.029
Extrinsic motivation	External regulation	0.28 (0.25)	1.32	.133

the higher the chance of continuation. Contrary to the expectations, EM identified regulation did not predict continuation, as did not EM external regulation. However, when the variable practical reasons for discontinuation was not included in the model, there were no effects of group or motivation (data not shown).

Discussion and conclusions

The women playing floorball showed higher levels of total intrinsic motivation than the women participating in spinning. Nielsen et al. (2014) compared the experiences and motivation associated with football and spinning and found that participating in a team game satisfied the basic psychological needs for feelings of competence and relatedness to others more than individual fitness activities in a male sample. This finding is supported by studies linking psychological need satisfaction to motivation (Jõesaar, Hein, & Hagger, 2011) and enjoyment (Quested, et al., 2013), as well as social affiliation (Wallhead, Garn, & Vidoni, 2013) to enjoyment and peer support to motivation (Griffith, King, & Allen, 2013). Therefore, higher satisfaction of the basic psychological needs is one possible cause of the higher levels of intrinsic motivation observed among the floorball participants compared to the spinning participants. However, as we did not measure basic need satisfaction, we cannot confirm this.

The floorball participants also had higher levels of identified extrinsic motivation. EM identified reflects behavioural regulation where the activity and the consequences of participating in this activity are valued highly by the individual. Both Griffith et al. (2013) and Wallhead et al. (2013) found that the social aspect is important for participation. Similarly, Nielsen et al. (2014) found that men participating in football exercise described having gained new friends as a beneficial outcome of being involved in the team game, while this was not mentioned by the men participating in spinning. Ottesen, Jeppesen, and Krustrup (2010) found similar trends in a study comparing women

participating in a football exercise intervention programme versus a running program. The reasons mentioned for this by the women were the interactive nature of the team game, making a higher degree of social interaction possible and resulting in friendships being created over time. As floorball is also a team game, it is probable that it produces similar experiences of closeness and friendship, which are then perceived as motivating positive consequences (outcomes) of the activity.

Furthermore, the floorball participants seemed to have higher EM introjected regulation than the spinning participants during the period. EM introjected regulation describes the individuals' internalised regulation of behaviour, with an external locus, for example to avoid guilt or anxiety or to maintain feelings of pride (Ryan & Deci, 2000). It is possible that since it takes several participants to form a team for playing during training sessions, the floorball participants knew that the team needed them to be able to play floorball, and hence were more motivated for the activity. This is supported by findings of Nielsen et al. (2014), who reported that their participants needed each other for playing.

Both floorball and spinning participants portrayed an increase in EM introjected regulation over the intervention, which did not differ between the groups. It is possible that the participants would feel guilty if they did not show up for training, as they got to know the other participants, the coaches facilitating the training and the researchers.

Intrinsic motivation predicted continuation after six and 12 months, corroborating earlier research (Ntoumanis, 2005; Ryan & Deci, 2007; Ryan, Frederick, Lepés, Rubio, & Sheldon, 1997). The results also highlight EM introjected regulation as important for continuation, indicating that rewards from the activity, such as friendships or better health, also play a role in continuation. This confirms earlier studies, which have found that this form of extrinsic motivation predicts continuation in women (Teixeira, Carraça, Markland, Silva, & Ryan, 2012).

Contrary to the expectations, EM identified regulation did not predict continuation. This is not in accordance with earlier studies that have found EM identified regulation to be a strong or even the strongest predictor of physical activity participation (e.g., Wilson, et al., 2012). It is possible that identification with a certain physical activity takes longer to develop than a 12-week intervention, and therefore, EM identified regulation probably had not developed enough to predict continuation.

Intrinsic motivation and EM introjected regulation predicted continuation only when being adjusted for practical reasons for discontinuation. This indicates that floorball, and perhaps team games in general, are better at securing continued exercise if constraints are not too prevalent. Aside from motivation, it seems that external barriers also play a decisive role in whether participants do or do not continue with an activity. External barriers might be more hindering for playing team sports, as they are not as flexible as individual activities conducted in a fitness centre. There are many fitness centres offering spinning classes for middle-aged women, whereas no club have yet offered floorball for women of this age-group. This has been suggested earlier by the qualitative research describing the difficulties for elderly not very football-able men to find a venue to play football at an informal, purely social level (Nielsen, et al., 2014). The notion is now backed up by quantitative results obtained from middle-aged women.

The fact that the groups had different training frequencies (two versus three) and trained in environments that were not completely the same (both groups had two training sessions at the research facility, and participants in the spinning group were asked to participate in one more on their own, in a local fitness centre) limits the results of the study. Both the training frequency and context can have an impact on the development of motivation. However, type of activity will, we argue, have a stronger impact on motivation, and since our results comply with theory, we believe that the difference in motivation levels is, at least in part, due to an activity type.

The results suggest that floorball elicits higher levels of motivation in middle-aged women, in particular intrinsic motivation, which increases the likelihood of continuation more than spinning. However, most prevalent exercise activities among women of this age group are different types of individual exercise (Laub & Pilgaard, 2013). Public health professionals and organisations should consider offering individual exercise and promoting team games involving physical activity in order to increase continuation in exercise among middle-aged women. One example of such a program is Football Fitness, in which football is played without a competition structure, as a leisure activity (Bennike, Wikman, & Ottesen, 2014). This particular way of organization attracts middle-aged women in particular (Bennike, et al., 2014). In combination with the findings of our study this suggests that developing and establishing a "Floorball Fitness" concept may be an attractive supplement that could also attract many women and motivate them to long-term adherence to regular exercise.

There are limitations that need to be addressed with regard to this study. Cronbach's alpha values of the subscales EM introjected regulation, EM external regulation and amotivation of the SMS were below the acceptable threshold of .70. However, the

item-total correlation test indicated that all scales except amotivation were reliable.

The second limitation is that no true baseline of motivation was included in this study. Because intrinsic (and, in part, extrinsic) motivation for a particular activity does not exist, and can therefore not be measured, before the individual has actually tried the activity, the first measures of motivation for floorball and spinning, were measured in week 2, when participants had had some experience with the activity. This is the closest one can get to a baseline measurement of motivation. Although we cannot rule out the risk that it can affect our results, we believe they are valid, because they comply with theory.

The third limitation is the low number of participants. Given the small sample, the results should be assessed before they are deemed valid. However, as these can be explained by theory, we believe they are valid. However, we cannot rule out the possibility of a type II error, and suggest that similar studies should be carried out with larger samples.

The fourth limitation is that, given that the study was part of a larger project with other research purposes, the two groups of women had different number of training sessions per week and different contexts in which they trained. It is possible that these differences could influence motivation, making the groups hard to compare. Although this limits the validity of our results, we still believe they are correct, given that they comply with theory.

Lastly, the intervention period in this study was only three months, lending weight to the point that the development in motivation, as well as the relationship between motivation and continuation, has not reached a stable level. Therefore, it is hard to discern any long-term effects of the difference between floorball and spinning.

The results of this study suggest that floorball is a more motivating activity than spinning for middle-aged women. It can be recommended to investigate this with other team games and individual activities, as well as with other target groups. In addition, cross-over studies, in which the participants switch activity half way through the study, so that any group differences in individual levels of initial motivation are controlled for, may be used to confirm the results of this study. Furthermore, longer periods than three months should be investigated to determine whether changes in motivation occur. For example, we have mentioned that EM identified regulation had not developed enough to predict continuation, and this could be a question to be scrutinized with longer periods. Last, but not least, it can be recommended to include qualitative investigations in further research.

This study investigated the motivating effect of two different types of exercise activities, floorball and spinning, on middle-aged women. Results suggest that floorball is a more motivating activity for middle-aged women, particularly with regard to intrinsic motivation. This is most likely due to the technically focused and socially interactive nature of floorball, which to a higher extent might satisfy the participants' psychological needs for feelings of competence and relatedness to others. Practitioners and policy makers should consider team games such as floorball when promoting physical activities as a public health promotion initiative, as these seem to produce higher motivation, and can potentially lead to higher continuation rates with regard to regular physical activity.

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