Goal orientation and performance adaptation: A meta-analysis

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Goal orientation and performance adaptation: A meta-analysis

The relationship between goal orientation and performance adaptation across studies was assessed in the present article. The relevance of performance adaptation can be exemplified by the desire to optimize performance and mitigate the negative effects of change in organizational and educational contexts (i.e. new co-workers, new software, emergencies). Three-level meta-analyses were conducted for learning goal orientation (LGO) and performance goal orientation (PGO). Furthermore, within PGO a distinction between avoid performance goal orientation (APGO) and prove performance goal orientation (PPGO) could be made. In moderator analyses the influence of measurement method of performance adaptation (subjective ratings vs objective scores) was assessed amongst others. Although significant effects were found they were primarily visible for subjective ratings and not objective scores.

Keywords: adaptive performance; adaptability; learning goal orientation; performance goal orientation; meta-analysis; adaption to change

1. Introduction

Dealing with unpredictable situations is immanent to our daily activities as we experience instability both at work and in our private lives. In cases where routine solutions are not working anymore, it is crucial to be able to overcome resulting problems. Behavioral reactions to changed work or learning situations can be described as performance adaptation and researchers have examined it since the end of the 20th century (Allworth & Hesketh, 1999).

After 15 years of research there is unanimity with regard to the crux of performance adaptation, which is dealing with change at the individual, team or organizational level (Marques-Quinteiro & Curral, 2012; Maynard, Kennedy, & Sommer, 2015). However, a number of issues, including conceptualization and measurement methods, could not be

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resolved (Jundt, Shoss, & Huang, 2015). Many researchers active in this field refer to the work of Pulakos and colleagues, who described adaptability on the basis of eight dimensions (Pulakos et al., 2002; Pulakos, Arad, Donovan, & Plamondon, 2000): (1) solving problems creatively, (2) dealing with uncertain or unpredictable work situations, (3) learning new tasks, technologies, and procedures, (4) demonstrating interpersonal adaptability, (5) demonstrating cultural adaptability, (6) demonstrating physically oriented adaptability, (7) handling work stress, and (8) handling emergencies or crisis situations. Since then other models have been proposed, however. Furthermore, multiple alternative names were introduced for performance adaptation, including adaptive performance, adaptability, adaptive expertise, post-change performance, and role structure adaptation. Only shortly prior to conducting the current meta-analysis some researchers attempted to review the relevant findings and reflect upon the inconsistencies between the available studies (Baard, Rench, & Kozlowski, 2014; Jundt et al., 2015). Following Baard and colleagues (2014) the term performance adaptation is used as an umbrella term in the present meta-analytics. Thus, previously mentioned names (adaptive performance, adaptive transfer, post-change performance etc.) are all considered to be instances of performance adaptation as they all refer to reactions to change in work or learning contexts (i.e. education).

Due to the relevance of performance adaptation researchers have tried to identify its antecedences. The list of examined variables includes cognitive abilities, goal orientation, self-efficacy, and transformational leadership (Baard et al., 2014; Bohle Carbonell, Stalmeijer, Könings, Segers, & van Merriënboer, 2014; Jundt et al., 2015). Hitherto only the role of personality factors (i.e. Big Five) has been systematically assessed in meta-analyses (Huang, Ryan, Zabel, & Palmer, 2014; Woo, Chernyshenko, Stark, & Conz, 2014). However, the strength of the relationship with performance adaptation was weak. Thus, the findings necessitate the search for other predictors of performance adaptation. At the time as those two meta-analyses were published a few narrative reviews emerged, which contain information

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about other seemingly relevant variables in the context of performance adaptation (Baard et al., 2014; Bohle Carbonell et al., 2014; Jundt et al., 2015; Maynard et al., 2015). In a recent meta-analysis (Author blinded for review, 2018) it could be confirmed that cognitive abilities promote performance adaptation ($r = .21$). Nevertheless, the moderate strength of the relationship indicates that high intelligence is not a prerequisite for performance adaptation. Thus, people with lower cognitive abilities may be able to compensate and show performance adaptation after all. One potential compensating mechanism involves motivation. Goal orientation, which is one of the most examined predictors in the adaptation research field, can be regarded as such a motivational factor. Therefore, a systematic quantitative review of the literature was conducted in the present study in order to assess the relationship between goal orientation and performance adaptation. However, according to the mentioned review articles substantial differences exist with respect to measurement methods used to assess performance adaptation across studies. Thus, a further goal of the present meta-analysis is to elucidate the influence of assessment methods on the relationship between goal orientation and performance adaptation.

1.1 Measuring performance adaptation

Following the review articles (Baard et al., 2014; Jundt et al., 2015) all forms of adaptation that were mentioned in the previous section are considered in the present study. Similarly to Baard and colleagues the respective adaptation conceptualizations are subsumed under an umbrella term of performance adaptation as they all refer to “altering behavior to meet the demands of a new situation, event, or set of circumstances” (Pulakos et al., 2000, p. 615). However, in the current meta-analysis the distinction is made between different information sources used to assess performance adaptation. The measures of performance adaptation are divided into two categories: objective performance adaptation scores and subjective performance adaptation ratings (Bohle Carbonell et al., 2014). The former refer

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predominantly to task outcomes (i.e. accuracy, efficiency), whereas the latter include self-reports and ratings from peers or supervisors.

Typically, when researchers decide to use objective performance adaptation scores in their studies, they adopt a task-change paradigm and confront participants with novel or modified situations, which require performance adaptation (e.g. Lang & Bliese, 2009). Accordingly, one can differentiate between pre-change performance and post-change performance. The induced change may affect single or several task parameters, e.g. difficulty, complexity, and dynamic (Bell & Kozlowski, 2008). Notwithstanding the fact that highly complex tasks can model real-world situations and thereby enable one to generalize particular research findings (Lang & Bliese, 2009) not all situations that require adaptability are that complex. Therefore, examining the response to change of single parameters is also needed. Complexity issues aside, change usually results in performance decrease, at least in the initial stages of the post-change phase. It pertains to the fact that strategies that were effective in the pre-change phase: (a) are not the most optimal ones in the post-change phase, (b) are not working anymore, or – in the worst case - (c) are counterproductive. Thus, it is necessary to adapt in order to maintain comparable performance levels to those achieved in the pre-change phase.

Several tasks have been utilized to gauge performance adaptation objectively, including tank-battle scenarios (Lang & Bliese, 2009), stock-pricing simulations (Howe, 2014), radar-tracing tasks (Kozlowski et al., 2001), video games (Hardy, Imose, & Day, 2014; Hughes et al., 2013; Randall, Resick, & DeChurch, 2011; Schuelke et al., 2009), and reproducing presentation slides (Keith, Richter, & Naumann, 2010). Accordingly, the type (e.g. complexity, difficulty, dynamic) and the extent of change vary considerably between the studies. Nevertheless, similar criteria are used to evaluate performance across the tasks. The objective scores are usually based on accuracy or error rate, i.e. in complex scenarios one can give participants points for correct decisions and subtract points for incorrect decisions (i.e.

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Bell & Kozlowski, 2008). Furthermore, particularly when using video games, one can also specify other criteria, i.e. population increase in a city simulation (Randall et al., 2011). However, it's important to note that not all authors adopt the task-change paradigm when measuring objective performance adaptation. A few researchers developed situational judgement tests (SJT), which require participants to specify their judgement or reaction to particular situations that necessitate performance adaptation (Chan & Schmitt, 2002; Grim, 2010). Thus, one shouldn't equate them with subjective measures.

In order to measure subjective performance adaptation one can typically either ask persons to rate themselves (self-report) or use person's peers or supervisors as a source of information (Bohle Carbonell et al., 2014). Several authors have developed respective instruments and many of those researchers refer to the already mentioned eight dimensions, introduced by Pulakos and colleagues (Pulakos et al., 2002, 2000), as the starting point for scale development. On the basis of theoretical considerations and empirical findings (i.e. factor analyses) some researchers decided to reduce the number of dimensions to five (Charbonnier-Voirin & Roussel, 2012), two (Kröger & Staufienbiel, 2012) or one global dimension of adaptation (Stokes, Schneider, & Lyons, 2010). Within the stream of studies based on subjective ratings one can differentiate between adaptability and adaptive performance. Whereas the former refers to the general capacity to adapt, the latter corresponds to the actual performance in a specific situation. Although the labels adaptability and adaptive performance have been used interchangeably in the extant literature (Allworth & Hesketh, 1999; Pulakos et al., 2002) they are not redundant. Even a highly adaptable person does not necessarily show high adaptive performance on every occasion. Thus, an additional goal of the present meta-analysis was to explore possible differences between the two conceptualizations of adaptation found in studies based on subjective adaptation ratings.

1.2 Goal orientation

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Goal orientation can be described as one's preferences in achievement-related contexts (Payne, Youngcourt, & Beaubien, 2007) or goals held during performance (Steele-Johnson, Beauregard, Hoover, & Schmidt, 2000). Usually researchers distinguish between learning goals and performance goals. As the research on goal orientation emanated from studies devoted to motivational theories (Cellar et al., 2011; Van Yperen, Blaga, & Postmes, 2015) it is not surprising that the goal attainment can be evaluated by drawing on internal and external criteria. Internal standards are used for learning goals and external standards are adopted in the context of performance goals. In other words, self-improvement (i.e. comparison with own previous performance) or task mastery is at the center of the learning goal orientation (Utman, 1997; Van Yperen et al., 2015). This is evidenced by the attitude of people high in learning goal orientation (LGO), who view making mistakes as a part of the learning activity (Ahearne, Lam, Mathieu, & Bolander, 2010). In contrast, people with high performance goal orientation (PGO) compare their performance to the performance of other people - i.e. peers – or they use some external norms to evaluate own performance (Utman, 1997; Van Yperen et al., 2015). Furthermore, within both types of goals (learning and performance goals) one may differentiate between approach and avoidance components (Cellar et al., 2011). Thus, people with performance goals may wish to prove their competence (prove performance goal orientation or PPGO) and avoid showing incompetence to others (avoid performance goal orientation or APGO). In contrast, people with learning goals want to show competence and avoid showing incompetence to themselves.

People can have consistent goals across situations or tasks but the goals can also vary. Accordingly, goal orientation can be conceptualized both as a trait variable and as a situation-dependent state variable (Kozlowski et al., 2001). Furthermore, one's goal orientation can be gauged through the use of respective questionnaires but it can also be induced by the means of instructions framing, i.e. "Do better than others" (Van Yperen et al., 2015). Thus, there are several possibilities to differentiate between goal orientations: performance vs learning goals,

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trait vs state goal orientation, measured vs induced goal orientation. In the present meta-analysis the focus lies on measured goal orientation. Therefore, in the following paragraph the types of measures used to assess goal orientation in the extant literature are described.

People can pursue several goals at the same time, which is why researchers usually describe learning goal orientation and performance goal orientation as separate dimensions (Kozlowski et al., 2001; Payne et al., 2007). Accordingly, some scales consist of two dimensions (i.e. Button, Mathieu, & Zajac, 1996; Sujan, Weitz, & Kumar, 1994). However, it was already mentioned that one could additionally differentiate between approach and avoidance goals for both learning goal orientation and performance goal orientation. Nevertheless, such measures (Elliot & McGregor, 2001) haven't been adopted in many studies. Instead, many researchers use measures with three subscales (Elliot & Church, 1997; Vandewalle, 1997), with a focus on learning goal orientation (LGO) and two types of performance goal orientation – prove performance goal orientation (PPGO) and avoid performance goal orientation (APGO).

Considering that goal orientation implies one's preferences during performance (Steele-Johnson et al., 2000) it is not surprising that researchers have also examined its relationship with actual performance. According to meta-analytic findings performance and learning goals are moderately related to task performance, academic performance, and job performance (Cellar et al., 2011; Payne et al., 2007), but the strength of the relationship depends on the context and goal type. Drawing on those findings a systematic examination of the relationship between goal orientation and another performance construct – performance adaptation – should be carried out in the present study.

1.3 Goal orientation and performance adaptation

It has been pointed out that certain goal orientations may be regarded as adaptive and others as maladaptive reaction patterns in achievement-related situations (Dweck, 1986; Kozlowski et al., 2001; Porter, Webb, & Gogus, 2010). Learning goal orientation leads to the

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allocation of attentional resources towards the task, which can enhance the performance (Van Yperen et al., 2015). In contrast, in the case of performance goal orientation the comparisons with other people require additional attentional resources which, in turn, cannot be devoted entirely to the task itself. Furthermore, concerns regarding failure (APGO) can also thwart performance because they distract away from the task. Indeed, according to meta-analytic findings learning goals can promote actual performance and performance avoidance goals may impair performance (Payne et al., 2007).

Changing circumstances force individuals to re-evaluate their strategies and can be regarded as a challenging situation, which requires adaptation. Accordingly, focus on self-improvement and the willingness to hone one's skills and learn from errors - all of which pertain to LGO (Davis, Dibrell, Craig, & Green, 2013) - may be beneficial when one has to learn a new task or learn to get along with new coworkers as in the context of performance adaptation. Indeed, in their review of performance adaptation research field Jundt and colleagues (2015) concluded that for learning goal orientation predominantly positive effects have been found. To illustrate, Kozlowski and colleagues (2001) found that people with high learning orientation tend to better adapt to changes within a radar-tracking task as evidenced by higher scores. People with high LGO also tend to report better adaptation (Marques-Quinteiro & Curral, 2012). Thus, it was expected that high learning goal orientation would be generally associated with better performance adaptation than lower LGO.

Hypothesis 1: Learning goal orientation is positively related to performance adaptation.

People with high performance goal orientation may be less likely to adjust their strategies in the context of change (Davis et al., 2013), which may be detrimental to adaptation. Therefore, it is not surprising that performance goals have been generally described as maladaptive (Kozlowski et al., 2001). However, whereas the assumption that LGO may be of benefit in the context of performance adaptation is supported by some

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empirical findings, the picture is more blurry when one turns to purported negative effects of performance goals on adaptation. In their review of the extant literature Jundt and colleagues (2015) assert that “there is mixed support for the importance of trait goal orientations as predictors of adaptive performance.” (p. 59). However, the inconclusive findings may be due to the failure to differentiate between different types of performance goals. In the performance adaptation research field researchers sometimes use global measures of performance goal orientation, which tap into both approach and avoidance aspects (Bell & Kozlowski, 2002; LePine, 2005). In other studies PPGO and APGO are assessed separately, however (Bell & Kozlowski, 2008; Davis et al., 2013).

Results from individual studies devoted to performance adaptation (Bell & Kozlowski, 2008) and meta-analytic findings pertaining to other performance constructs – i.e. task performance (Cellar et al., 2011; Payne et al., 2007) – indicate that PPGO is less maladaptive than APGO or even not maladaptive at all. In other words, avoid performance goal orientation may have more profound effects on adaptation than prove performance goal orientation. Specifically, individuals may be less likely to try out new strategies, because they could potentially lead to more errors. Therefore, it was expected that the strength of the relationship between performance goal orientation and adaptation would depend on the type of assessed orientation (PGO, PPGO, APGO). Specifically, it was hypothesized that APGO would be more disadvantageous in the context of adaptation than PPGO. However, no hypothesis is provided with respect to whether the relationship between APGO and adaptation would be stronger than the relationship between global performance goal orientation and adaptation, because PGO contains both approach and avoidance components.

Hypothesis 2: The relationship between performance goal orientation and adaptive performance is conditional on the type of performance goal orientation (prove/PPGO, avoid/APGO, global/PGO). APGO is negatively related to adaptation and the relationship is of larger magnitude than in the case of PPGO.

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Additionally, it was hypothesized that the strength of the relationship between learning goal orientation and adaptation would depend on the method used to gauge adaptation. The distinction between objective performance adaptation scores and subjective performance adaptation ratings seems to be a very important one because the magnitudes of intercorrelations indicate that the two measurement methods tap into different aspects of performance adaptation. To illustrate, in four different studies the respective correlations varied between $r = .10$ and $r = .43$ (Baumgartner, 2015; Beuing, 2009b; Stokes et al., 2010; Upchurch, 2013). Therefore, the influence of the measurement method (objective vs subjective) was considered as a moderator in the present meta-analysis. Owing to the lack of systematic research nondirectional hypotheses were formulated.

Hypothesis 3: Measurement method of performance adaptation (objective scores vs subjective ratings) moderates the relationship between learning goal orientation and adaptation.

2. Methods

2.1 Literature search

Only reports, in which the relationship between goal orientation and performance adaptation was investigated, were relevant for the present meta-analysis. Several strategies were adopted in order to identify such studies. First, two databases (PsycINFO, Google Scholar) were used to locate relevant reports. For the predictor variable the appropriate keyword was *goal orientation*. In contrast, for performance adaptation several names have been used in the extant literature (Jundt et al., 2015; Maynard et al., 2015). Therefore, utilizing many keywords (i.e. adaptability, adaptive expertise, post-change performance) was necessary in order to conduct an exhaustive literature search. A full list of keywords can be found in the appendix. Furthermore, the references of three narrative reviews were examined (Baard et al., 2014; Bohle Carbonell et al., 2014; Jundt et al., 2015).

2.2 Inclusion criteria

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In order to be considered for the present meta-analysis studies had to meet the following criteria: (a) relevant variables were measured (at least one goal orientation dimension and performance adaptation), (b) sample sizes and effect sizes or at least data enabling the calculation of effect sizes (e.g. *t*-values, *p*-values, means etc.) had to be reported, and (c) the report was written in either English, German, Polish, Swedish or Dutch. However, only one relevant article (de Jonge, 2017) was found written in a non-English language (Dutch).

2.3 Excluded studies

No geographical or cultural exclusion criteria were formulated, but only a few studies were found that were conducted with non-western participants. Furthermore, in two studies LGO was assessed relative to PGO (Beuing, 2009b; Unger-Aviram & Erez, 2016) making it impossible to estimate the raw correlation between LGO and performance adaptation. In one study effect sizes were reported for LGO relative to a do-your-best strategy (Howe, 2014). Therefore, all three studies had to be excluded from further analyses.

In order to check the relevance of studies both the title and the abstract were read. However, in some cases the full text was used to determine whether a particular study met the specified inclusion criteria. Both literature search and relevance check were carried out between May and September 2015. Additionally, in January 2018 a search for reports published since 2015 was conducted. All reports considered in the current meta-analyses are included in the references and marked with an asterisk (*).

2.4 Coding

In total, three people were responsible for data extraction (LS and two graduate students). With the exception of the Dutch study, all studies were coded by two persons. LS/KM and LS/WS coded studies identified during the first and second search wave, respectively. Discrepancies were resolved through discussions. In order to estimate the mean effect size individual effect sizes from studies and respective sample sizes were coded. Furthermore, data with regard to potential moderator variables was extracted too. Specifically, measurement

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method of performance adaptation (objective vs subjective), mean age of the sample, level of measurement (individual vs team), proportion of men in the sample, publication year, peer review, country, sample type, and measure of goal orientation (see Table 1 for a description of those variables). In addition, effect sizes based on subjective adaptation ratings were classified as broad or narrow depending on the items used in the respective study. Whereas narrow effect sizes refer solely to behavior (adaptive performance) broad conceptualizations of adaptation can be regarded as a mixture of behavior, skills, preferences, and values. This mixture is sometimes labeled as adaptability (Ployhart & Bliese, 2006). To illustrate, the I-ADAPT measure developed by Ployhart and Bliese contains not only items referring to behaviors or actions – i.e. “When something unexpected happens, I readily change gears in response” – but also items based on trait-like attributes – e.g. “I am an innovative person”. Thus, effect sizes based on the I-ADAPT measure would be classified as broad in the present meta-analysis.

Variable	Description
Adaptation assessment method	Method used to gauge adaptation (objective vs subjective)
Country	Where was the study conducted?
Sample type	Student sample vs other samples (workers, managers etc.)
Level	Measurement level (individuals or teams)
Peer review	Did the study successfully go through the peer review process?
Publication year	When was the relevant report published or written?
Age	Mean age of the sample (in years)
Goal orientation scale	Method of measuring goal orientation
Proportion of men	Proportion of men in the sample

Table 1. Description of the coded moderator variables

2.5 Effect size

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For the present meta-analysis the correlation coefficient r was regarded as the optimal effect size. Following the conventions introduced by Cohen, $|r| = .10$, $|r| = .30$ and $|r| = .50$ were defined as the small, medium and large correlation respectively (Cohen, 1992). In the present meta-analysis a positive sign of an effect size indicates that people with a high goal orientation (i.e. learning goal orientation) show or report on average better performance adaptation than persons with relatively low goal orientation.

In some studies researchers used several methods to assess performance adaptation (i.e. task, self-report, supervisor rating) and computed an effect size for each of them, resulting in multiple effect sizes for one sample. As they are based on the same participants they cannot be regarded as independent. In order to avoid loss of information all relevant effect sizes were retained and three-level meta-analyses (Cheung, 2015) with individual effects nested within studies were conducted. In case of heterogeneous effect sizes three-level meta-analytic models yield more accurate estimates (i.e. standard errors) than standard two-level meta-analyses based on averaged or selected outcomes (Assink & Wibbelink, 2016; Cheung, 2014).

Due to profound differences between the studies (i.e. theoretical approaches, methodological issues, types of participants) it was not assumed that there is only one true effect for the relationship between goal orientation and performance adaptation. Instead, the true effects were allowed to vary both within the studies and between the studies (random effects). R package *metafor* (version 2.0-0) was used to perform the meta-analyses (Viechtbauer, 2010). The results are based on restricted maximum likelihood estimation.

2.6 Outlier and heterogeneity analyses

Before conducting the main analyses a search for outliers was carried out. Specifically, Cook's distance values were used for the respective analysis (Viechtbauer & Cheung, 2010). Furthermore, Q and I^2 statistics were calculated in order to assess heterogeneity within and between studies. Significant Q values indicate that the effect sizes are heterogeneous, but it's

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difficult to interpret values of the Q statistic. In contrast, I^2 values indicate the proportion of true variance (between-study and within-study variance) on the total variance (true variance + sampling error). Due to the restricted range (0%; 100%) it is possible to differentiate between low (25%), moderate (50%), and high (75%) proportion of true heterogeneity (Higgins, Thompson, Deeks, & Altman, 2003). In order to avoid loss of information metric predictors were used in the meta-regression models whenever applicable (proportion of men, mean age of the sample, and publication year).

2.7 Publication bias

Due to data dependency the procedures developed to assess publication bias in one or two-level meta-analyses (Anzures-Cabrera & Higgins, 2010; Bax et al., 2009; Duval & Tweedie, 2000; Orwin, 1983; Rosenberg, 2005) are not so straightforward to implement in meta-analyses with more than two levels. Nevertheless, two methods were used in the present meta-analysis which can give a hint of publication bias. Specifically, the publication status of every report was coded (peer-reviewed study vs gray literature / unpublished studies) in order to systematically assess differences through moderator analyses. Another method used to check for publication bias is a regression test (Begg & Mazumdar, 1994; Egger, Smith, Schneider, & Minder, 1997). A correlation between effect sizes and a precision estimate (i.e. sampling variance, sample size) would indicate that there is an asymmetry in the distribution of the effect sizes. This may be due to publication bias (e.g. studies based on small samples are not being published if only a small effect has been found). Similarly to the approach of Habeck and Schultz (2015) sampling variances were used as a moderator in order to test for asymmetry.

3. Results

Results for the relationship with adaptation are reported first for learning goal orientation and are followed by the results for performance goal orientation. The main results are summarized in Tables 2 and 3.

3.1 Results for learning goal orientation (LGO)

3.1.1 Sample characteristics

23 independent samples ($N = 3837$) could be identified and 41 effect sizes were coded. Moreover, the fact that performance adaptation is a relatively new research field was reflected in the publication dates of the reports. Specifically, the first relevant study was published in 2001 and the newest in 2017 ($M = 2011$, $Mdn = 2010$). The smallest study included 20 participants and the largest 400 ($M = 166.8$, $Mdn = 125$). Several researchers didn't report the mean age of the sample and the proportion of men. Therefore, the results based on those variables have to be interpreted with caution. Most samples were relatively young ($M = 27.24$ years, $Mdn = 21$, Minimum = 19.18, Maximum = 53, $k = 19$), and both women and men were equally represented (percentage of men: $M = 53.70\%$, $Mdn = 47.57\%$, Minimum = 20%, Maximum = 100%, $k = 21$). Of the 41 effect sizes 22 were based on objective performance adaptation scores rather than subjective ratings. Further descriptive statistics are reported in Table 2.

Analysis	<i>k</i>	<i>N</i>	<i>r</i>	CI	<i>Q</i>	<i>I</i> ²
Overall	23	3837	.18***	[.11, .26]	342.15***	85.89%
Adaptation assessment method						
Objective scores	13	2546	.11***	[.05, .16]	31.69	54.95%
Subjective ratings	11	1476	.28***	[.16, .39]	127.28***	86.83%
Country						
USA	14	2636	.12***	[.06, .19]	55.40***	67.91%
Other	9	1201	.27***	[.13, .41]	105.91***	88.65%
Sample						
Student sample	14	2434	.16***	[.08, .24]	129.72***	78.03%
Other sample	9	1403	.21**	[.07, .35]	212.40***	92.21%
Level						
Individual	21	3636	.18***	[.10, .26]	339.03***	87.52%
Team	2	201	.26***	[.17, .35]	1.85	0%
Peer review						
Peer reviewed	13	2114	.16***	[.07, .25]	93.40***	82.14%
No peer review	10	1723	.22**	[.09, .35]	181.97***	88.65%

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Publication year						
Up to 2010	12	2250	.20***	[.11, .30]	233.39***	87.36%
After 2010	11	1587	.16*	[.04, .28]	108.73***	83.26%
Age						
Over 21	9	1555	.28***	[.15, .41]	258.84***	91.73%
Up to 21	10	1943	.11**	[.04, .18]	44.11***	64.07%
Goal orientation scale						
VandeWalle	12	2471	.18**	[.06, .31]	218.56***	91.60%
Other	12	1716	.18***	[.10, .26]	76.81***	70.97%
Proportion of men						
High (> .50)	7	1098	.12	[-.05, .29]	69.04***	88.46%
Small ($\leq$.50)	14	2542	.20***	[.11, .29]	270.93***	86.22%

Notes: r = weighted mean correlation; k = number of independent samples; N = total sample size; CI = confidence interval limits (95%); $Q = Q$ statistic; $I^2 = I^2$ statistic; For ease of interpretability results for only two categories of each metric moderator (publication year, age, proportion of men) are reported, for meta-regression results based on metric moderators see text.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2. Three-level meta-analytic results for the relationship between learning goal orientation and performance adaptation.

3.1.2 Effect

The mean effect size for learning goal orientation was $r = .18$ ($p < .001$). As expected (Hypothesis 1), people with high learning goal orientation tended to show or report better performance adaptation than people with relatively low learning goal orientation. However, individual effect sizes ranged from $r = -.11$ to $r = .61$ indicating heterogeneity. Indeed, effect sizes exhibited a high proportion of true heterogeneity ($Q = 342.15$, $df = 40$, $p < .001$, $I^2 = 85.89\%$). More than 85% of heterogeneity was due to random variance rather than sampling error. However, most of the variance was due to between-studies differences rather than within-study differences ($\sigma_b^2 = 0.025$ vs $\sigma_w^2 = 0.004$).

3.1.3 Moderator analyses

The main findings of the moderator analyses are summarized in Table 2. Four predictors could explain significant amounts of the heterogeneity in the respective meta-regression

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models. As expected (Hypothesis 3), the strength of the relationship between learning goal orientation and performance adaptation depended on the measurement method of performance adaptation ($p = .009$). Larger effect sizes were found when subjective performance adaptation ratings rather than objective scores were used ($r = .28$ vs $r = .11$). According to the pseudo R^2 this moderator could account for 42% of the variance between the studies. The differences between the two assessment methods are visualized by a box plot (Figure 1). Additionally, within the group of subjective ratings a distinction was made between broad (adaptive performance + adaptability) and narrow (adaptive performance) conceptualizations of adaptation. In total, 10 effect sizes were classified as broad and nine correlations were coded as narrow. In the respective moderator analysis no evidence was found that the relationship with goal orientation is significantly different for the two types of subjective ratings ($p = .412$, $r = .32$ and $r = .21$ for narrow and broad conceptualization of adaptation respectively).

Figure 1. Box plot showing range and distribution of individual effect sizes reflecting the relationship between learning goal orientation and performance adaptation. The respective effect sizes are grouped by the assessment method of adaptation (subjective adaptation ratings vs objective adaptation scores). On average larger effect sizes were reported when subjective adaptation ratings rather than objective adaptation scores were used. The width of the box corresponds to the number of effect sizes belonging to the respective category.

In another moderator analysis country could be identified as a statistically significant predictor ($p = .019$, $R^2 = .31$). Specifically, smaller effect sizes were reported for studies conducted in the USA rather than in other countries ($r = .12$ vs $r = .27$). However, the country variable was confounded with the measurement method variable, because most of the effect sizes (78.95%) based on subjective performance adaptation ratings were computed for non-American samples and most of the effects based on objective scores (90.91%) were calculated for studies based on American samples. Thus, instead of reflecting cross-cultural differences the results indicate that different assessment methods of performance adaptation were used in different countries. Another significant moderator variable was proportion of men ($p = .025$, $R^2 = .19$) as larger effects were reported for samples dominated by women. Finally, mean age of the sample could also explain some heterogeneity ($p = .014$, $R^2 = .24$) but inspection of the scatter plot led to the conclusion that the relationship may be spurious, because only a few effect sizes were based on relatively old samples. All other predictors were statistically insignificant (all $ps \geq .440$, all between-studies R^2 s = 0).

3.2 Results for performance goal orientation (PGO)

3.2.1 Sample characteristics

18 independent samples were identified ($N = 3009$) for which 47 effect sizes were coded. All relevant studies that could be identified were published between 2001 and 2017 ($M = 2010.22$, $Mdn = 2010$). Sample size varied between 22 participants and the 400 individuals

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($M = 167.2$, $Mdn = 131$) and most samples were relatively young ($M = 27.36$ years, $Mdn = 21$, Minimum = 19.33, Maximum = 53, $k = 15$). Furthermore, the sex ratio of the samples was close to one (percentage of men: $M = 53.80\%$, $Mdn = 48\%$, Minimum = 20%, Maximum = 100%, $k = 16$). Slightly more than half of the effect sizes (27) was based on objective adaptation scores rather than subjective ratings (20).

3.2.2 Effect

The mean effect size was not significantly different from zero ($r = .00$, $p = .994$), but individual effect sizes ranged from $r = -.46$ to $r = .29$. There was a considerable proportion of true heterogeneity ($Q = 277.18$, $df = 46$, $p < .001$, $I^2 = 82.57\%$). Over 80% of heterogeneity was due to true variance rather than sampling error. A high proportion of heterogeneity could be attributed to within-study differences rather than between-studies differences ($\sigma_w^2 = 0.021$ vs $\sigma_b^2 = 0.003$). Therefore, it seemed reasonable to conduct a moderator analysis.

3.2.3 Moderator analyses

As expected (Hypothesis 2), there were differences between the three types of performance goal orientation ($p < .001$). Specifically, a negative relationship was found between APGO and adaptation ($r = -.15$, $p < .001$). Thus, people with a high avoid performance goal orientation tend to show or report worse adaptation than individuals with lower APGO. Furthermore, the relationship was stronger ($p < .001$) than in the case of PPGO ($r = .07$). Although no hypothesis was formulated for a global measure of performance goal orientation (PGO) its relationship with adaptation ($r = .05$) was weaker ($p = .001$) than in the case of APGO. In total, the type of performance goal orientation accounted for more than half of the within-study variance ($R^2 = .52$). The differences are also illustrated by the means of a box plot (Figure 2). However, when the three dimensions were analyzed separately to compute within-group heterogeneity slightly different correlation estimates emerged (see Table 3). Most importantly, the relationship between APGO and adaptation was not statistically significant anymore ($r = -.12$, $p = .088$). However, in contrast to PPGO a high proportion of

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true heterogeneity could be identified ($I^2 = 90.56\%$ vs $I^2 = 28.17\%$). Indeed, the 12 effect sizes ranged from $r = -.46$ to $r = .13$. Therefore, explorative moderator analyses were conducted for APGO in order to explain the differences between effect sizes. The same set of moderator variables was used as in the case of learning goal orientation. A summary is included in Table 4 and the most important findings are reported in the next paragraph.

Figure 2. Box plot showing range and distribution of individual effect sizes reflecting the relationship between performance goal orientation and adaptation. The respective effect sizes are grouped by the type of performance goal orientation (APGO = avoid performance goal orientation, PPGO = prove performance goal orientation, PGO = [global] performance goal orientation). On average effects of larger magnitude were reported for APGO than for PPGO or PGO. The width of the box corresponds to the number of effect sizes belonging to the respective category.

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Analysis	<i>k</i>	<i>N</i>	<i>r</i>	CI	<i>Q</i>	<i>I</i> ²
Overall	18	3009	.00	[-.05, .06]	277.18***	82.57%
Type of PGO						
Global	9	892	.05	[-.05, .15]	39.26**	60.98%
Prove	9	2117	.06**	[.02, .10]	15.91	28.17%
Avoid	8	1717	-.12	[-.26, .02]	111.31***	90.56%

Notes: *r* = weighted mean correlation; *k* = number of independent samples; *N* = total sample size; CI = confidence interval limits (95%); *Q* = *Q* statistic; *I*² = *I*² statistic; Estimates of the mean effect sizes for the three types of PGO deviate slightly from the meta-regression's estimates because they were computed separately (see text for more accurate estimates).

* *p* < .05. ** *p* < .01. *** *p* < .001.

Table 3. Three-level meta-analytic results for the relationship between performance goal orientation (PGO) and performance adaptation.

Analysis	<i>k</i>	<i>N</i>	<i>r</i>	CI	<i>Q</i>	<i>I</i> ²
Overall	8	1717	-.12	[-.26, .02]	111.31***	90.56%
Adaptation assessment method						
Objective scores	5	1054	.01	[-.08, .10]	13.18*	57.47%
Subjective ratings	3	663	-.35***	[-.44, -.26]	11.39*	64.61%
Country						
USA	4	967	.00	[-.11, .12]	12.44*	70.39%
Other	4	750	-.25**	[-.44, -.06]	35.93***	89.19%
Sample						
Student sample	6	1261	-.06	[-.21, .10]	77.30***	88.95%
Other sample	2	456	-.32***	[-.44, -.20]	6.76*	69.48%
Level						
Individual	8	1717	-.12	[-.26, .02]	111.31***	90.56%
Team	0	-	-	-	-	-
Peer review						
Peer reviewed	5	980	-.06	[-.19, .06]	19.16**	76.79%
No peer review	3	737	-.22	[-.52, .07]	64.79***	95.41%
Publication year						
Up to 2009	5	1061	-.18*	[-.35, -.02]	67.80***	89.58%
After 2009	3	656	-.02	[-.27, .24]	23.78***	90.93%
Age						
Over 22	4	750	-.25**	[-.44, -.06]	35.93***	89.19%

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Up to 22	4	967	.00	[-.11, .12]	12.44*	70.39%
Goal orientation scale						
VandeWalle	7	1525	-.13	[-.30, .03]	100.15***	91.61%
Other	2	542	-.05	[-.14, .03]	0.20	0%
Proportion of men						
High (> .50)	4	848	-.03	[-.22, .15]	24.08***	86.58%
Small ($\leq$.50)	4	869	-.20*	[-.40, .00]	63.17***	91.36%

Notes: r = weighted mean correlation; k = number of independent samples; N = total sample size; CI = confidence interval limits (95%); $Q = Q$ statistic; $I^2 = I^2$ statistic; For ease of interpretability results for only two categories of each metric moderator (publication year, age, proportion of men) are reported, for meta-regression results based on metric moderators see text.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4. Three-level meta-analytic results for the relationship between avoid performance goal orientation and performance adaptation.

When examining the relationship between APGO and adaptation almost all of the variance could be attributed to between-studies differences rather than within-study differences ($\sigma_b^2 = 0.033$ vs $\sigma_w^2 = 0.006$). Two moderator variables could explain some proportion of the true heterogeneity: assessment method of performance adaptation and country. A stronger relationship between APGO and adaptation was found when subjective performance adaptation ratings rather than objective performance adaptation scores were used ($r = -.35$ vs $r = .01$). This moderator variable could account for all the variance between the studies ($p < .001$, $R^2 = 1$) Furthermore, effects of larger magnitude were reported for studies conducted in countries other than USA ($r = -.25$ vs $r = .00$, $p = .021$, $R^2 = .46$). However, the relationship may be spurious because all studies based on subjective performance adaptation ratings were conducted in countries other than USA and most of the studies based on objective performance adaptation scores were conducted in USA. All other moderator variables were statistically not significant (all $ps \geq .085$, all between-studies R^2 s $\leq .24$).

4. Discussion

The main objective of the current meta-analysis was to systematically examine the relationship between different types of goal orientation and performance adaptation. It is the

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first quantitative synthesis with regard to the influence of motivational factors in the context of performance adaptation. Hitherto, only the role of Big Five personality traits (Huang et al., 2014; Woo et al., 2014) and cognitive abilities (author blinded, 2018) has been systematically examined. Summing up, the main results of the present study were concordant with the hypotheses. Specifically, people with high learning goal orientation (LGO) seem to show or report better performance adaptation than people with lower LGO. Furthermore, people with high avoid performance goal orientation (APGO) show on average worse performance adaptation than individuals with low APGO. However, neither prove performance goal orientation (PPGO) nor a global measure of performance goal orientation (PGO) were strongly related to adaptation.

Present findings are in accordance with the conclusion of Jundt and colleagues (2015), who stated in their review of performance adaptation research field that mixed findings exist with regard to the relationship with goal orientation. Specifically, for both LGO and APGO a high proportion of true heterogeneity was identified. This, in turn, indicates that it is important to consider moderators when interpreting the relationship with performance adaptation. It was expected that the measurement method of performance adaptation (objective scores vs subjective ratings) would account for at least some part of the true heterogeneity in the case of LGO. The respective hypothesis could be confirmed and an explorative analysis indicated a similar pattern for APGO. Specifically, LGO and APGO were strongly related to subjective performance adaptation ratings ($r = .28$ and $r = -.35$ respectively) but not objective performance adaptation scores ($r = .11$ and $r = .01$ respectively). The effects found for subjective performance adaptation ratings may be larger due to common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), as both goal orientation and subjective performance adaptation ratings were typically measured via the same method.

Mean effect sizes computed for objective performance adaptation scores seem to be robust as indicated by the relatively small proportion of true heterogeneity. Hitherto

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researchers avoided utilizing both objective performance adaptation scores and subjective performance adaptation ratings in their studies, as only one such study has been identified for the current meta-analysis (Upchurch, 2013). However, present findings corroborate the assumption that it is important to differentiate between objective and subjective measure. This distinction has been made previously in one review article devoted to the adaptation research field (Bohle Carbonell et al., 2014). The relevance of this distinction has been tested for the first time with the current meta-analysis. One may be inclined to put the importance of this distinction into question by arguing that objective scores are only used with student samples or in laboratory studies rather than field studies. However, it is important to note that the assessment method was not confounded with sample type (i.e. students vs employees) in the present meta-analysis. Thus, the identified differences between subjective adaptation ratings and objective adaptation scores cannot be explained by the differences between the samples.

Apart from the measurement method of performance adaptation only one consistent moderator could be identified – country. For both LGO and APGO a stronger relationship with performance adaptation was found for studies based on non-American samples. Nevertheless, it seems that measurement method of performance adaptation and country are redundant predictors. Hitherto, for American participants almost exclusively objective performance adaptation scores were used. In contrast, performance adaptation of other samples was predominantly measured by subjective ratings.

Interestingly, level of measurement (individual vs team) had no influence on the relationship between learning goal orientation and performance adaptation. One could argue that this corroborates the conclusion that individual performance adaptation is strongly related to team performance adaptation (Han & Williams, 2008). Nevertheless, it is important to note that only two team studies could be identified for the present meta-analysis. Thus, more team studies are needed in order to rule out differences between the two measurement levels.

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Because of data scarcity it was not possible to consider variables such as study duration in the moderator analyses. According to the available data, duration of the experiments varied between 45 minutes and 5 hours, but there were also studies that required participants to come back after several days or even months. Hence, there appears to be a substantial variability between the studies. With respect to the reliability of the instruments it can be concluded that it was acceptable, because most of the reliability coefficients crossed the .70 mark. Only in one study the reliability was somewhat lower for one of the goal orientation dimensions as indicated by the value of .62 (Heimbeck, Frese, Sonnentag, & Keith, 2003). Also in the case of instruments developed to measure subjective performance adaptation the reliability was acceptable with the lowest value being .67 (Beuing, 2009a).

Respective outlier and publication bias analyses indicated that the main results are robust. Publication bias seems to be negligible in this research field, because the relevant moderator variable (peer review; journal articles vs gray literature) was not statistically significant. However, somewhat smaller effects were reported in journal articles than in other publications (i.e. master's thesis). Modified Egger's regression tests (Habeck & Schultz, 2015) yielded significant findings for LGO and APGO, such that a weaker relationship with performance adaptation was reported in smaller studies. However, considering that smaller effects were reported in journal articles it is highly unlikely that the magnitude of mean effects was overestimated in the present-meta-analysis. Nevertheless, the findings corroborate the assumption that it is necessary to consider gray literature when conducting meta-analyses in order to avoid biasing the estimation of the mean effect size.

4.1 Limitations and future directions

One limitation of the current meta-analysis pertains to its reliance on zero-order correlations between goal orientation and performance adaptation. Considering that performance adaptation is a process it may seem surprising that temporal analyses were conducted only occasionally. Only few researchers attempted to go beyond the cross-sectional framework and

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relying just on the mean performance in the post-change phase as proxy for performance adaptation (Ahearne et al., 2010; LePine, 2005; Page, 2004). In order to account for the fact that people tend to overcome initial difficulties and can eventually reach a stable performance level (plateau), those few researchers additionally took the adaptation rate into account. Considering only the mean performance adaptation in the post-change phase may preclude from identifying possible dynamic and nonlinear patterns (Ahearne et al., 2010). Furthermore, considering the usual post-change performance decrease, one could wonder why this transition is not additionally modelled. Lang and Bliese (2009) were the first in this research field to examine performance adaptation using such a longitudinal framework and modelling the change-related discontinuity in the performance trajectories. This approach accounts for the fact that people adapt at different pace. Hitherto only a few researchers adopted this framework in order to search for antecedents of performance adaptation (Bliese, McGurk, Thomas, Balkin, & Wiesensten, 2007; Niessen & Jimmieson, 2016; Wheeler, 2012), however. In the context of goal orientation only two studies were identified where the longitudinal framework was adopted (de Jonge, 2017; Howe, 2014). According to Ployhart and Vandenberg (2010) the reluctance regarding the adoption of longitudinal frameworks can be attributed to uncertainty (which methods are appropriate? how many measurement points are necessary?). However, the existence of tutorials and guides (e.g. Bliese & Lang, 2016; Ployhart & Ward, 2011) may help to eliminate the uncertainty.

Another limitation of the current meta-analysis pertains to the results for avoid performance goal orientation. Its relationship with performance adaptation was examined in a small number of studies. Only eight such studies were identified, so that the results of moderator analyses have to be interpreted with caution as there were only a few studies within each subgroup.

Furthermore, some researchers have encouraged separating the avoidance and approach component not only in the case of performance goal orientation but also for the

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learning goal orientation. Unfortunately, it was not possible to identify any relevant studies where this framework was adopted. In the case of performance goal orientation it could be confirmed that collapsing approach and avoidance performance goals is not a good idea, because it may conceal the true relationship with the construct of interest. Both prove performance goal orientation and collapsed performance goal orientation were more weakly related to adaptation than avoid performance goal orientation. Thus, it cannot be ruled out that the distinction between approach and avoidance goals is also important when assessing the relationship between learning goal orientation and performance adaptation. The meta-analytic findings of Van Yperen and colleagues (2015) for general performance indicate that avoid learning goal orientation could be even less recommended than avoid performance goal orientation. However, the direct comparison was based on only three studies in their meta-analysis.

Although, many of the moderator patterns were consistent across the analyses (for LGO and APOGO) most of the predictors were not statistically significant in the respective meta-regressions. Generally, the power of moderator analyses is rather low (Pigott, 2012), so that a small number of effect sizes makes it difficult to detect effects of even substantial magnitude. However, the methodological moderator that was examined (assessment method of performance adaptation) could explain a lot of heterogeneity and was also statistically significant.

It has to be noted that the proposed distinction between objective scores and subjective ratings is not the only possibility to differentiate between different types of performance adaptation. For the relationship between goal orientation and performance orientation an additional distinction was made in the current study, however. Specifically, subjective ratings based on a broad definition of adaptation (adaptive performance, knowledge, skills, dispositions etc.) were compared with the narrow conceptualization (adaptive performance only). It could be argued that such conceptual differences may be at least in part responsible

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for the heterogeneity identified within the subjective performance adaptation ratings in the current meta-analysis. According to the moderator analysis no differences were found between the two conceptualizations but the number of effect sizes in this analysis was not large (19). Thus, the finding has to be interpreted with caution.

Considering that one can distinguish between task and social (cultural) performance adaptation (Beuing, 2009a; Ferro, 2014; Kröger & Staufenbiel, 2012) it may be fruitful to consider situational aspects, e.g. presence of others, in the future studies. According to another meta-analysis the advantage of learning goal orientation seems to disappear (Utman, 1997) when people are tested alone (without coparticipants). It would be interesting to test this relationship with regard to social performance adaptation.

Another moderator tested in the context of general performance is task complexity (Steele-Johnson et al., 2000; Utman, 1997). There is preliminary evidence that people with learning goal orientation excel at difficult tasks that require performance adaptation (LePine, 2005). Echoing the call from other researchers (Baard et al., 2014; Hughes et al., 2013; Jundt, 2009; Wheeler, 2012) it has to be stated that further tests with regard to task difficulty or complexity are needed in the performance adaptation research field.

Finally, in the future studies one could explore the relationship between goal orientation, performance adaptation, and other variables. One possibility is to try to replicate the interaction between goal orientation and cognitive abilities found in one study (Bell & Kozlowski, 2002). Furthermore, there is some evidence that the relationship between goal orientation and performance adaptation could be mediated by self-efficacy (Jundt et al., 2015).

In sum, findings of the present meta-analysis indicate that measures of goal orientation have little practical relevance unless one only wants to predict subjective performance adaptation. In the context of personnel development one could try to improve performance adaptation by modifying goal orientation (see Joung, Hesketh, & Neal, 2006 for an example

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of training for adaptive performance). However, considering that people's opinion is not the most reliable source of information when it comes to estimating performance or competences (Kruger & Dunning, 1999), it could be counterproductive to rely on such subjective measures of performance adaptation. Therefore, there is not much benefit for practitioners in using solely trait goal orientation to predict performance adaptation. Relying on trait measures of goal orientation rather than inducing it has been criticized before in the context of general performance (Van Yperen et al., 2015). However, in the current meta-analysis only three studies were identified where researchers tried to induce a specific goal orientation and not only measure it (Beuing, 2009b; Howe, 2014; Unger-Aviram & Erez, 2016). Conducting more studies of this type and thereby focusing on proximal rather than distal motivational variables could enrich the performance adaptation research field.

5. Conclusions

The main findings from the current meta-analysis indicate that goal orientation is related to subjective performance adaptation ratings rather than objective scores. Thus, the present article includes evidence for the assertion that methodological differences can at least partially account for heterogeneous findings within the performance adaptation research field (Jundt et al., 2015). The mixed findings and especially the (very) small effect sizes found for objective scores cast doubt on the importance of distal motivational variables in the context of adaptive performance. However, further studies are needed in order to examine the relationship between more proximal motivational factors (i.e. induced goal orientation) and performance adaptation. Other researchers are encouraged to apply the longitudinal approach when examining the strength of this relationship (Lang & Bliese, 2009).

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APPENDIX**Keywords**

Goal orientation

Adaptation

- Adaptable performance
- Adaption to change
- Adaptive expertise
- Adaptive performance
- Adaptive transfer
- Individual adaption
- Organizational adaption
- Performance adaptability
- Performance adaptivity
- Performance adaption
- Performance adjustment
- Postchange performance
- Role flexibility
- Role structure adaptation
- Team adaption
- Unforeseen change