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Mentoring functions:

Interpersonal tensions are associated with mentees' creative achievement

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Abstract

There are different functions a mentor can perform for a mentee. The literature on mentoring creativity reveals many proposed functions for mentees' creativity like advancing relevant skills, role-modeling, career-related and psychosocial support. However, only qualitative studies actually investigated how different functions each contribute each specifically to mentees' creativity. Accordingly, research broadly discusses “mentoring works”, but no quantitative study looked further into mentoring functions for the field of creativity. The association between these functions and creativity was investigated in an online study with 161 participants including artists, writers, and scientists using existing items from two mentoring scales. Additionally, we measured ability to be autonomously creative with a self-developed scale. We first performed a factor analysis on mentoring items. Several distinguishable functions emerged: Advancing domain relevant skills, role-modeling, interpersonal tensions, career-related and psychosocial support. Creative autonomy was related to psychosocial support. Second, we investigated whether different mentoring functions are associated with everyday creativity and creative achievement, that is, checked for concurrent validity of interpretation. Surprisingly, functions proposed in the mentoring literature could not predict creative outcomes, but interpersonal tensions did for creative achievement. We hypothesize results could be explained by a demanding achievement-orientation of mentors; or arguing about ideas in non-hierarchical relationships.

Keywords: mentoring functions, German mentoring scale, negative mentoring, German

CAQ, German CBI

Mentoring functions:

Interpersonal tensions are associated with mentees' creative achievement

Mentoring can be seen as a supportive factor of the environment for developing creativity (Cropley, 2006; Shaughnessy, 1991). The supported individual is called either *mentee* or *protege* depending on the field of research. In the context of creativity, mentoring can be defined as an intentional, committed, and nurturing relationship between two persons, with the focus on both professional and personal development (Kim & Zabelina, 2011). Shaughnessy (1995) called mentoring “a creative alternative to direct instruction and teaching [that] probably provides a more emotionally supportive relationship” (p.1). When individuals feel supported and encouraged to be creative, they experience less stress and tension, and are more likely to play with ideas and to take risks (Amabile, 1996). In contrast, a constraining social environment hinders creativity (Amabile, 1983).

Most of what we actually know about mentoring creativity stems from qualitative studies with small or specific samples as seen when investigating mentoring creativity in the domain of science. One of the first studies investigating mentoring creativity did so in Nobel laureates. Zuckerman (1977) described that Nobel laureates learned from their mentors important tacit knowledge. More recent examples of research are two studies evaluating different mentoring programs. In the first one, 23 adolescents stated a deeper understanding of the creative process, especially in natural science, after program participation (Subotnik, Edmiston, Cook, & Ross, 2010). In the second one, 14 academic mentees from social sciences reported reduced sense of isolation and improved organization skills leading to research outcomes like writing grant applications as well as publishing journal and conference papers (Ewing et al., 2008).

One of the few examples of quantitative studies with bigger samples is a historiometric study of 499 eminent scientists. It compared career experiences of high and low-achieving scientists and found that having had a mentor who helped set early career direction was more important than the number, involvement, and eminence of mentors (Mumford et al., 2005).

To our knowledge, Torrance's seminal longitudinal study was the only quantitative study that psychometrically investigated the benefits of mentoring for creativity (Torrance, 1980, 1981, 1983, 2002). In his study, having had a mentor was correlated to creative outcomes in a medium to even high range, depending on gender, time when mentorship occurred, considered time for creative outcomes and creative outcome itself. With ten participants from Torrance's study, Millar (2002) further illustrated in case studies the improvement of creative achievement in mentored individuals in high school and the years afterward.

Unfortunately, none of these studies did investigate whether the degree to which mentors provide different mentoring functions directly impacts specific benefits received by mentees. This relationship has been suggested by Kram (1985). What is known about mentoring functions stems in fact to a large extent from disciplines other than creativity research. The first to conceptualize different functions of mentoring from the perspective of developmental psychology was Levinson (1978). Based on interview data from 40 men, he suggested mentors offer sponsoring, professional socialization, role modeling, counseling, and support in the realization of a mentee's personal dream. Furthermore, Levinson's study is worth mentioning here, because of his participants ten were creative writers and ten were scientists, although he did not specifically examine mentoring creativity.

Following the concept proposed by Levinson (1978), nature and influence of mentoring

was investigated in a study with 139 gifted adults, who had been honored about 20 years earlier as adolescents by the U.S. Presidential Scholars Program (Kaufmann, Harrel, Milam, Woolverton, & Miller, 1986). Based on the frequency of reported functions, the authors concluded that role modeling and encouragement were more relevant functions than professional socialization. The relevance of the relationship was suggested to lie “in the transmission of attitudes and values” (Kaufmann et al., 1986, p. 577).

Another study that investigated possible functions in mentoring specifically creativity was of qualitative nature. In his study mentioned earlier, Torrance (1983) derived five functions from responses to the open-ended question “What did this person do that influenced you the most?” (from most to least frequent): (a) being encouraged, praised, prodded, (b) model of behavior, (c) offered career, business professional information, (d) taught to play “the game” (behaving according to accepted customs, obeying the rules) and (e) helped make career choice.

Outside the field of creativity, the research on mentoring functions made considerable progress in theory and methodology since Torrance published his study on mentoring creativity (Torrance, 1983). First, the concept of mentoring functions was further developed with functions being subsumed under two major factors, which were proposed based on interview data from 18 mentoring dyads in a business and organization context (Kram, 1983): psychosocial (e.g. role modeling, friendship, emotional support, encouragement) and career-related (e.g. providing advice, discussing goals). The first study using quantitative methods (based on the rated desirability of different functions) confirmed a two factor model of mentoring functions (Schockett & Haring-Hidore, 1985). Another quantitative approach by Scandura and her associates (using actual received mentoring) could separate role modeling as a third distinct

factor (Castro, Scandura, & Williams, 2004; Scandura & Ragins, 1993; Scandura, 1992; Williams, 1999).

In mentoring for college success, even four functions were identified (Nora & Crisp, 2007) and confirmed for their construct validity of interpretation (Crisp, 2009): (a) setting goals and choosing a career path, (b) supporting a mentee psychologically and emotionally, (c) being a role model, and (d) advancing academic subject knowledge. Subsequently, it was argued that these four functions also apply to the field of creativity (Kim & Zabelina, 2011). However, the concurrent validity of interpretation of those four functions was only investigated concerning college success (Crisp, 2010) and not concerning creativity. Furthermore, studies examined mentoring only in a sample of college students. It has been criticized before that beneficial outcomes for academic success can not be interpreted for external validity beyond those narrow samples of college students (Crisp & Cruz, 2009). This goal is however difficult to achieve with the questionnaires applied, as the content of many items used was extremely specific to the context of college success (e.g. "While in college, I have had someone in my life who helps me carefully examine my degree or certificate options").

Nevertheless, a comparison of the mentioned qualitative study on mentoring functions by Torrance (see above) shows conceptual overlap with the quantitative studies outside creativity research. "Being encouraged, praised, prodded" from Torrance's study seems to resemble Scandura's mentoring function of psychosocial support, as "model of behavior" does for role-modeling. Aspects of "offered career, business professional information" and "taught to play 'the game'" derived by Torrance can be found both in Crisp's advancing of academic subject knowledge, as well as Scandura's career-related support, although the latter clearly also includes

Torrance's "helped make a career choice". Given the similar concepts, existing scales of mentoring functions could be suitable for quantitative studies in creativity research, if the wording of items is general enough to be applied in the contexts of creativity.

While a milestone in creativity research, there was also a shortcoming to Torrance's sample. As his longtime study started when participants were in elementary school, he had no possibility in influencing the composition of occupations in his adult sample. Thus, there were not many individuals with genuinely creative occupations. Of 101 adult participants only 12 were from the domain of fine arts, two were writers and three were scientists (Torrance, 2002). Accordingly, it is unclear whether the effects of mentoring concerned a more general role of mentoring for anybody's creativity in everyday life or its specific role for highly creative contributions in a given field. This difference in impact is important, because it reflects the (by now classical) distinction between different magnitudes of creativity in the theory of creativity: little c and Big C creativity (Kozbelt, Beghetto, & Runco, 2010). The latter focuses on highly creative contributions accepted and acknowledged by the social environment. The former refers to creativity of everyday life for which the creative experience is the main issue. Everyday creative activity is especially of interest as it is not only a behavioral prerequisite of actual creative achievement, but is the only facet of creativity that has direct latent relationships to all other facets, whether they are about personality or cognition (Jauk, Benedek, & Neubauer, 2013; Richards, 2010).

Broadening the concept of mentoring

The majority of empirical articles mentioned in the present article investigated current mentoring relationships at the time of study or ones that occurred just before (as when evaluating

mentoring programs) the respective study. Noticeably, the studies by Levinson (1978), Kaufmann et al. (1986) and Torrance (1983, 2002) stand out concerning the time when a mentoring relationship in question occurred. Levinson looked at mentoring relationships in early adulthood. Torrance (1983) asked participants whether they ever had have a mentor. Additionally, Torrance (2002) asked for other mentoring experiences in the open response part of his study: About 33% of responses were about mentoring that occurred in high school or earlier¹. Similarly, Kaufmann et al. (1986) asked individuals about mentoring experiences without focusing on a certain life-span. Interestingly, many participants referred not to current relationships, but to individuals they met, when they were young (e.g. 66% teachers). This result suggests that the mentoring relationship, which has the most impact on a mentee's present, is not necessarily the most recent one. This is consistent with the view that “the skills of the mentor travel with the protege long after the relationship has ended” (p. 1, Shaughnessy, 1995).

Such a perspective differs from the common approach. Often, before asking any information about her mentoring relationship, participants were asked whether they have been or are currently mentored. However, this approach entails two methodological problems. First, a dichotomization in mentored vs. non-mentored is artificial and does not reflect reality. Research found not qualitative (“criterion present vs. non-present”), but quantitative (“more vs. less”) differences between, for example, mentorships and typical supervisor relationships (Burke, McKenna, & McKeen, 1991). In other words, both relationships differ only in their level of interaction. Accordingly, it is a simplification to assume a clear-cut threshold at which a guiding individual “switches” suddenly from, for example, regular boss to a mentor. This would be as if one separates individuals in two groups of either extroverted or introverted, despite extraversion

¹ Own calculation from data presented by Torrance (2002, p. 98).

existing on a continuum. Thus, not being mentored is just an endpoint of a continuum with increasing intensity of interaction or strength of relationship. This is consistent with the view, that being mentored is not an “all or nothing” experience (Gentry, Weber, & Sadri, 2008). The question at which point a relationship is worth being regarded as mentoring is also connected to the following point.

Traditionally, a mentor is seen as a person with certain characteristics. For instance, some studies describe mentors as wiser and older than the mentee (Allen, McManus, & Russell, 1999; Gentry et al., 2008; Shaughnessy, 1995). However, the definition given by Kim and Zabelina (2011) does not necessarily imply such a characteristic (see above). Given the traditional view, a mentee might consider a supporting individual (despite fulfilling mentoring functions) not as a mentor, just because the concerning individual does not correspond to the mentee's notion of a mentor. That is, one person is being mentored, without being aware and/or labeling it as such. Indeed, Torrance (1983) reported some cases, where participants claimed no mentoring relationship had existed, but it was obvious from other information that one or both parents had been mentors. Obviously, they did not think of family members as possible mentors.

One (albeit radical) way to approach this problem might be to avoid the term “mentor” to participants altogether, ask instead for influential persons in one’s life and define results as mentoring (Burke & McKeen, 1997). We tried to find a middle ground by encouraging participants to consider the term “mentor” more broadly.

This approach enables participants to consider also peers as mentors. But can peer-support actually be considered mentoring? In fact, hints from the literature suggest that the two forms are not so different after all. Levinson (1978) argued that a mentor is a blend of peer and

parent. One study found that scientists explained important career-relevant relationships from different categories (including peers) with words usually used to describe mentoring relationships (Murdock, Isaksen, & Tricanati, 1993). Another study investigated peer-to-peer support in 11 dancers under the term “horizontal mentoring” (Keinänen & Gardner, 2004). Outside the field of creativity, peer-support is commonly reported as peer-mentoring by qualitative (Kram & Isabella, 1985) and quantitative research (Allen et al., 1999; Darling, Hamilton, Toyokawa, & Matsuda, 2002). One study actually investigated the difference between different mentoring relationships empirically. While there was no difference in psychosocial support among different types of mentors, mentees with more experienced mentors reported to receive more career-related support and role-modeling (Ensher, Thomas, & Murphy, 2001). Thus, in our opinion, the distinction between peer mentoring and traditional mentoring is not categorical but rather continuous, similarly to the boss-mentor example noted above.

Creative autonomy

As mentoring is in one way or another about social interaction, the question arises how it relates to a mentee's autonomy. Autonomy is one of the core characteristic of the creative personality (Barron & Harrington, 1981; Feist, 1998). In a broad sense, this trait describes the independence from influence of the group (Feist, 1999). Others refer to it more narrowly as “the preference for regulating oneself, instead of being regulated or controlled by social forces” (Sheldon, 2011). In fact, when talking about autonomy, most researchers implicitly center around the negative influence from the social environment, something from which one has to shield or withdraw oneself at times (Feist, 1999). In this perspective, autonomy reflects the shielding of negative influences. A different aspect of autonomy would be the independence of positive

influences. We are interested in the independence from an aspect of *positive* influences, as mentoring is a supportive factor of the environment. Autonomy could interfere with available support, for example, when a mentee is more able to build on ideas and concepts alone than discussing them with one's mentor. For the purpose of the present study, we define creative autonomy as the ability to be creative independently from support, to pro-actively engage in creativity without external "fuel".

The present study

Our study was motivated by several shortcomings of the present literature on mentoring creativity. First, research barely moved beyond qualitative investigations in small samples. The few quantitative studies that exist investigated mentoring creativity in a single domain or with few genuinely creative occupations. Second, there is a complete lack of quantitative studies investigating mentoring functions for creativity. Third, the differentiated impact of received mentoring on different magnitudes of creativity is unknown. Finally, there is no work on the relationship between autonomy and the support by the environment.

The purpose of the present study is to quantitatively investigate the specific impact of mentoring functions on different magnitudes of creativity with a sample including individuals from creative professions like artists, writers and scientists. Furthermore, we explore the relation between creative autonomy and received mentoring.

Methods

Participants and sampling

There is a great abundance of recommendations and rules of thumb concerning sample

size in factor analysis either based on the idea of *a priori* minimum sample size or a given subjects-to-variables ratio. However, empirical research has shown that the correspondence between sample and population factors is mainly determined by communalities and not by sample size due to the higher effect-size of the former (MacCallum, Widaman, Zhang, & Hong, 1999). Thus, we see our sample size as sufficient for a factor analysis.

The whole sample included 161 individuals (50.9% females). The mean age was 40.6 years (18-76 years, SD = 13.7, Mdn = 37.0). Beside participants who were creative in their leisure time, the sample consisted to 62.5% of individuals, who had a creative occupation (multiple answers were possible): 30% individuals indicated author or writer as their profession, 23% reported to be a professional artist, sculptor, designer or illustrator, 12% were scientists, and 2% were performing artists like musicians and actors. Non-creative occupations were, for example, merchant, teacher, manager or other businessperson, child care worker, and bank teller.

Participants were recruited via personal networks or contact through their e-mail addresses displayed on their respective personal homepage, in social networks specifically for artists, writers or scientists, and through institutions with programs for mentoring artists, writers or scientists, respectively. E-mails contained a short description of the purpose of the study and an invitation with a link to LimeSurvey®. LimeSurvey® (<http://www.limesurvey.org/>) is a tool for creating and conducting online surveys in which the participants can give their answers anonymously by following a sent link. As all participants were invited equally by e-mail with a link, we could not keep track of whether individuals invited to the survey followed the link. Accordingly, the proportion of respondents recruited through social networks or institutions can not be reported. All participants gave informed consent prior to the participation.

Instruments

Creative autonomy. Creative autonomy was measured with a self-developed scale consisting of four items. Items are “I've been already inventive and had lots of ideas before I got support”, “Encouragement helps me, but even without it I manage to be creative”, “Even if no one helped me, I would feel the need to be creatively active” and “I am sometimes simply productive for myself, without me to show the resulting products or work to someone“. Participants rated their agreement to statements on a 5-point Likert scale. Cronbach's α for this scale was .73.

Creative outcomes. In order to measure creative achievement, participants gave self-reports in the form of a self-translated German version² of the Creative Achievement Questionnaire (CAQ, Carson, Peterson, & Higgins, 2005). The translation of items of creativity tests was done by the first author and checked by the second one (for the mentoring items vice versa). The CAQ specifically asks for accomplishments in ten creative fields, so called domains, which are: Visual arts, creative writing, scientific discovery, music, dance, architectural design, humor, theater and film, inventions, and culinary arts. It focuses on the so called “Big C” or “Pro-C”, highly creative contributions accepted and acknowledged by the social environment (Kaufman & Beghetto, 2009). Examples are “I have had a showing of my work in a gallery.” or “I have sold my work to a publisher.” Because items of the CAQ scale are not like Likert-items but based on a step model and accordingly not tau-equivalent, we do not report Cronbach's alpha for the CAQ (Silvia, Wigert, Reiter-Palmon, & Kaufman, 2012). We log-transformed the CAQ-scores for all statistical analyses as it has been suggested before, as creative achievement

² The German version of the test can be downloaded from the first author's homepage.

generally shows left-skewed distribution (Silvia et al., 2012). The assessed highly creative expressions can probably be found more often in genuinely creative occupations. That is not to say that other professions never require creativity. However, the former engage deeper in the creative process and the primary job function of its members is to be creative. We checked accordingly the construct validity of test score interpretation of the German translation of the CAQ: Individuals that are supposed to be creative (like artists, writers and scientist) should score higher on a creativity test. A two sided t-test revealed ($t = -4.0, p < .001$) that individuals with a creative occupation ($N = 100, M = 1.1, SD = 0.8$) scored significantly higher on the CAQ than individuals with a non-creative occupation ($N = 61, M = 0.7, SD = 0.5$), thus indicating good concurrent validity of test score interpretation of the German CAQ. CAQ scores correlated with Openness to Experience ($r = .44, p < .001$), confirming concurrent validity of test score interpretation.

Everyday creative activity was measured with the revised version (Dollinger, 2003) of the Creative Behavior Inventory (CBI; Hocevar, 1979), which was translated into German². In contrast to the CAQ, the CBI is a measure of everyday creative activity (Silvia et al., 2012). The 28-item questionnaire asks for common creative activities and behaviors and how often they occurred in the past. Items (“I designed and made my own greeting cards” or “I painted an original picture”) were rated in frequency on a 5-point ordinal scale. Cronbach's α for the revised CBI is .89 (Dollinger, 2003). In our sample, scores of the German CBI showed good internal consistency ($\alpha = .85$) and were normally distributed (Shapiro-Wilk, $p > .05$). Creative professionals ($N = 100, M = 43.8, SD = 17.7$) scored significantly higher than non-creative professionals ($N = 61, M = 34.8, SD = 17.6$) in a two sided t-test ($t = -3.2, p < .005$). This result

supports the concurrent validity of test score interpretation of the German CBI together with a significant association of CBI scores with Openness to Experience ($r = .48, p < .001$). CAQ and CBI correlated on a significant, but low level ($r = .27, p < .01$). As both tests correlate with each other, it indicates that both measure creativity, while the correlation is sufficiently low to suggest that both tests measure different aspects of creativity. Thus, this result supports the discriminant validity of test score interpretation of both German versions of the tests.

Mentoring. Before answering any questions about mentoring, participants read not only an explanation of the term mentoring but also the following statement, modified from Darling et al. (2002): “It may well be that you have received mentoring, without perceiving that person as a mentor. Please consider whether a person (relative, friend, colleague, supervisor etc.) has ever influenced you in your personal development or during your training. It is not important whether the influence was good or bad or how it affected you. If you can think of more than one person, consider for the following questions only those that influenced you the most or left the most impression.” We define this developmental relationship as mentoring. We thus did not ask participants whether they currently have a mentor, but broadened the focus on the life span like Kaufmann et al. (1986) and Torrance (1983).

To measure the various functions of mentoring, a multi-dimensional assessment is necessary. So far, there is no German mentoring scale available. Instead of developing completely new items from scratch, we translated items from existing self-report measures. This approach allowed us to build on the knowledge that already exists about these questionnaires. All nine items were taken from the Mentoring Functions Questionnaire (MFQ-9; Castro et al., 2004), the revised, shortened version of the Multidimensional Mentoring Measure for business contexts

(Scandura & Ragins, 1993). It measures the mentoring functions career-support, psychosocial support and role-modeling, each with three items. The interpretations of those dimensions have been shown to have good concurrent validity in predicting many non-creative outcomes like personal learning, salary level and reduced family-work conflict among others (Lankau & Scandura, 2002; Nielson, Carlson, & Lankau, 2001; Scandura & Ragins, 1993; Scandura, 1992).

Furthermore, in order to take into account that, first, mentoring may naturally occur outside of formal or professional contexts and, second, mentoring may be performed by peers, we also added 14 items from an unnamed scale that successfully investigated both (Darling et al., 2002). Items were chosen from subscales indicating aspects of teaching/role-modeling, friendship, emotional support and tension (see Table 1). The wording of the items from the MFQ-9 (Castro et al., 2004) were changed from “my mentor” to “this person” as used by Darling et al. (2002) to have a uniform term. Participants rated the agreement to which each statement described their mentoring experience on a 5-point Likert scale ranging from “applies very well” to “not at all”.

Personality traits. Personality traits were not main variables, as measuring mentoring in relation to personality was not the topic of the present study. More precisely, the German version of the Big Five Inventory (BFI; Lang, Lüdtke, & Asendorpf, 2001) was only applied to check for the concurrent validity of the interpretation of CAQ and CBI scores as creativity measures. Items of the BFI are rated based on a 5-point Likert scale. The five-factor or Big Five model of personality hypothesizes that there are five dimensions of personality (Digman, 1990; McCrae & Costa, 1987): Openness to experience, Neuroticism, Extraversion, Agreeableness, and Conscientiousness. As Openness is associated with creativity across domains (Batey & Furnham,

2006), only the Openness items of the 44 Items of the German BFI were initially evaluated. However, an evaluation of all personality dimensions turned out to be valuable for a *post hoc* analysis (see below). Thus, a further inspection of items was applied. It indicated that two items showed to be problematic both in the original publication and in our data after a factor analysis fixed to a number of five factors (data not shown): Although assigned to the trait Extraversion, the item “I am enthusiastic, can carry others away” in the original publication loaded higher on Openness (Lang et al., 2001). The same applied for our data (not shown). In the original publication, the item “I’m often involved in arguments” had the same loading for the target factor Agreeableness as for Neuroticism. In our data the latter was even higher. Accordingly, both items were excluded from further analyses (α = ranged from .63-.87).

Statistical analysis

In order to determine mentoring functions, we applied principal component analysis on items as recommended in absence of *a priori* factor structure (Brown, 2009; Costello & Osborne, 2005). Principal component analysis was based on a correlation matrix as extraction method. The chosen rotation method was oblique. Cattell's scree-test (Cattell, 1966) suggested either a three or five factor solution. An examination of both solutions yielded a more consistent pattern for five factors based on item content. The five extracted components/factors accounted for 69.2% of the variance. The first factor had the greatest eigenvalue of 6.4 (31.5% accounted variance), followed by four other factors with eigenvalues above one [7.2 (15.2%); 3.5 (6.8%); 1.6 (6.4%); 1.5 (4.8%); 1.0 (4.5%);]. The factor loadings for the five factor solution are shown in Table 1. There were several adequately to strongly loading items (.50 or better) on nearly all factors. This allowed to drop items with cross-loadings higher than .32 as recommended (Costello & Osborne,

2005). For factor 3 (interpersonal tensions) higher cross-loadings had to be tolerated to have a minimum number of three items, as a factor with fewer items is considered weak and unstable (Costello & Osborne, 2005). Based on these criteria, 18 items from initially 23 could be used to build different subscales (see Table 1). All analyses were performed with SPSS Statistics 20.0 Software (IBM SPSS Inc. Chicago, IL).

INSERT TABLE 1 HERE.

Results

Concerning the kind of relationship to their mentor, 31.7% of participants gave information their mentors had been teachers, trainers or lecturers, 18.0% had been relatives, 16.8% had been friends, 13.7% had been co-workers, colleagues or partners in projects, 10.6% had been bosses, 5.6% had been other peers, and 3.1% had been spouses.

To determine how items built different subscales measuring different mentoring functions, mentoring items first were analyzed for underlying factor structure. Items loaded on five different factors. Details can be seen in Table 1. Eighteen items built five different subscales. The first mentoring function encompassed seven items concerning psychosocial support. An example for an item loading on factor 1 is "I shared personal problems with this person". Note that this factor also included items like "I served as a source of emotional support for this person" indicating mutual support and thus a non-hierarchical relationship. Three items concerning advancing domain relevant skills ("I acquired knowledge, information, or skills from this person") characterized factor 2. The third factor can be described by interpersonal tensions ("This person and I would get angry at each other", three items), the fourth one by career-related support ("This person devoted special time and consideration to my career", three items). The

last factor is about role-modeling (“I got a lot of my values from this person”, three items).

Cronbach’s alpha for the subscale derived from items loading on the factor advancing domain relevant skills was $\alpha = .77$, for psychosocial support $\alpha = .89$, for interpersonal tensions $\alpha = .50$, for role-modeling $\alpha = .77$, for career support $\alpha = .79$. For a possible explanation why the subscale interpersonal tensions has such a poor internal consistency, see discussion.

To investigate the distinctive impact of a mentoring function on a mentee's creativity, correlation analyses were performed. Correlations of mentoring functions and creativity measures can be seen in Table 2. The only significant, *positive* association between a mentoring function and a creativity measure was between interpersonal tensions and creative achievement ($r = .20, p < .05$). A regression analysis with relationship type as control variable (dummy coded) indicated no differential effect of the relationship type ($p < .05$). It was also analyzed, whether occupation (creative vs. no-creative) influenced responses by including occupation as control variable (dummy coded). While the effect of tension remained significant ($p = .002, \beta_{\text{Tension}} = .23$), occupation did also have an effect ($p < .000, \beta_{\text{Occupation}} = .33$). (Given that creative achievement is the outcome variable, this is actually not surprising. It is not more than saying “Individuals with creative occupations report higher creative achievement.”)

INSERT TABLE 2 HERE.

To further investigate the construct of mentoring creativity, it was also assessed to which extent the ability to be creative independently from support is negatively associated with received mentoring. In other words, the point of interest was, whether less autonomous individuals get more support by mentors. However, the ability to be autonomously creative was *positively* correlated to received psychosocial support ($r = .17, p < .05$) and interpersonal tensions

($r = .18, p < .05$). Furthermore, there were correlations between creative autonomy and everyday creative behavior ($r = .44, p < .01$) and creative achievement, respectively ($r = .18, p < .05$).

The association of tensions with creativity raises the question of whether both these variables could be causally influenced (i.e. confounded) by personality traits. For example, creative individuals score commonly higher on Openness to Experience. Accordingly, they could intellectually challenge their mentor more often, leading to arguments. In this case, interpersonal tensions would rather be a “by-product” of certain personality traits which also favor creativity. To target this issue, we performed *post-hoc* regression analyses for creative achievement with interpersonal tensions as independent variable, controlling for all five personality traits. While this model explained a significant level of variance ($R^2 = .22, p = .009$), only Openness ($p < .001, \beta_{Op} = .41$) and interpersonal tensions ($p = .05, \beta_{Tension} = .15$) were predictors (all other p 's $> .05$). A second model with only Openness ($p < .001, \beta_{Op} = .42$) as co-variate performed similarly ($R^2 = .22, p < .001$). Interpersonal tension was still a predictor of creative achievement ($p = .04, \beta_{Tension} = .16$).

Discussion

The purpose of the present study was to investigate which mentoring functions occur in the context of creativity and how they contribute to mentees' creative achievement and everyday creative activity. A factor analysis on German mentoring items identified five distinct factors underlying different functions. Given the content of subscales, we labeled the different functions psychosocial support, advancing domain relevant skills, interpersonal tensions, career-related support and role-modeling. The reliability of the score interpretations from different subscales

can be considered as acceptable to good based on internal consistency of subscales, with the exception of interpersonal tension which had poor internal consistency. A possible explanation is that this subscale probably consists of items that subsume a heterogeneous mixture of negatively perceived mentoring experiences. Outside the field of creativity research, negative experiences are well documented. Systematic approaches showed negative mentoring experiences reach from behaviors being targeted to one specific mentee to general interpersonal tendencies of a mentor (Eby & Allen, 2002; Eby, Butts, Lockwood, & Simon, 2004; Eby, McManus, Simon, & Russell, 2000; Levinson, 1978; Simon & Eby, 2003). This variety of different negative mentoring experiences might be the cause of the poor internal consistency of the subscale interpersonal tensions which could be attributed to such negative experiences. Additionally, the number of items was quite small with three items, although this was not a problem in the other subscales.

A comparison with other quantitative studies shows that our results are in line with mentoring functions in college or organizational settings. Although a function concerned with advancing a mentee's domain relevant skills and knowledge plays no role in models of mentoring in business context, our finding of such a function is consistent with findings in college contexts labeled as “academic subject knowledge support” (Crisp, 2009; Nora & Crisp, 2007)³. The same applies for a function concerned with psychological and emotional support (Crisp, 2009; Nora & Crisp, 2007), which is also known from models of mentoring in business context (Kram, 1983; Scandura & Ragins, 1993). Similarly to other quantitative studies (Crisp, 2009; Scandura & Ragins, 1993), we found role-modeling as an own distinct factor separated from psychosocial support. A function concerned with career-related support was also found in those studies mentioned.

³We wanted to stay with the term “domain” as it is common in creativity research.

One might assume that the ability to be autonomously creative is negatively associated with received mentoring. For example, highly autonomous individuals might be less interested in searching advice or accept supportive suggestions. A correlational analysis indicated however that the opposite might be the case. Creative autonomy has a positive correlation with received psychosocial support. This observation could either be explained by assuming that the individuals concerned show more initiative and pro-actively ask for support, rather than waiting for advice; the high self-efficacy of creative individuals support this view (Feist, 2010). Or alternatively, being supported strengthens their feeling of independence as Torrance (1984) suggested.

To our own surprise most mentoring functions were not associated at all with mentees' creativity. The only function actually positively associated to mentees' creative achievement was interpersonal tensions. The results have to be interpreted with caution due to the poor internal consistency of this subscale. The effect of interpersonal tensions on creativity achievement remained significant even when controlling for personality traits. The independence of this effect from mentees' personality traits indicates that causes for tensions are to be sought on the part of mentors.

Negative mentoring experiences were not the primary target of the present study. Accordingly, we can only hypothesize what kind of mentor behavior causes an increase in mentees' creative achievement. One possibility could be an achievement-oriented mentor. Ballet dancers in a case study reported to be incited to higher performances by a socially rejecting and highly demanding mentor (Keinänen & Gardner, 2004). Experimental research could show that negative affective states after a bad evaluation of performance subsequently caused an increase

in artistic creativity (Akinola & Mendes, 2008). This could be connected to Gardner's concept of "asynchrony", which assumes that tensions or asynchronies between principal factors of human behavior give rise to creative works (Gardner, 1993). Acar (2011) viewed the concept more broadly as "asynchronicity" defining it as an appropriate level of discrepancy to stimulate creativity, and argued to apply it in educational contexts. "Contrary to frequently suggested approaches such as unconditional positive regard, which refers to acceptance of ideas without any criticism, asynchronicity suggests confronting the individual with the defects and drawbacks of creative products and encourages showing ways to improve creativity at the creator's pace" (Acar, 2011, p.76).

Note, this effect could also be interpreted as being not specifically about creativity, but about performance in general, as negative feedback can lead to increased subsequent effort (Anderson & Rodin, 1989; Campion & Lord, 1982; Podsakoff & Farh, 1989). Thus, it might be possible that negative emotions caused by negative feedback by the mentor had a positive influence on mentees' efforts. This interpretation would also explain why we found an association to creative achievement, but none to everyday creative activity, which is probably less performance orientated. A mentor would then rather resemble the role of an achievement-oriented parent always demanding high performance from her child, a so-called "figure skater parent". Such a familial influence on later achievement is supported by research in male children (Albert, 1978). A recent, female example is violinist Vanessa-Mae and her mother, who told her daughter that "her love for her was 'conditional' on her performance as a musician" (para. 4, Deacon, 2008).

Another explanation could be that tensions themselves drive creative achievement.

Runco (1999) suggested the relevance of different forms of tensions for creativity with interpersonal tensions as one among them. When the experiential advantage of mentors becomes or already is small (as for example in peer mentoring), this opens up a space for less hierarchy with more arguing and debating. Empirical support for a beneficial effect of such “intellectual sparring” comes from the domain of science. A study of 499 eminent scientists comparing career experiences of high and low-achieving scientist suggested that the critical component of collaborations is active intellectual exchange (e.g. colleagues providing intellectual stimulation) (Mumford et al., 2005). Moreover, active intellectual exchange explained significant variance in scientific achievement. There are also numerous reports of prominent dyads challenging each others ideas. Those examples span from closely working relatives (Wright Brothers [Runco, 1999]), over creative collaborations (Lennon and McCartney [Shenk, 2014]) to examples where the boundary between friendship and true competition became blurred (Einstein and Hilbert [Wuensch, 2015]). All relationships were characterized by tensions, but which were fruitful for creativity. Whichever explanation holds to be true, tensions seem to actually fuel creativity. Further research should investigate this issue in more detail. For example, future studies could address negative mentoring experiences more differentiated, as this was not the target of the present study.

A possible limitation of our study is the method of sampling. Samples from social network bare the risk of selective sampling. A comparison shows, however, that the mean scores of the five personality dimensions in our study are in the same range of another online study (Marcus, Machilek, & Schütz, 2006) and another creativity study (Benedek et al., 2016), both using the BFI to measure personality. Thus, our sample seems to be not biased in any direction,

at least in terms of personality.

Concerning the causal effect of mentoring creativity, most people would expect that mentoring is beneficial to creativity. However, correlational studies do not prove causal directions. It could be that autonomy is the causal factor initiating creativity, and that having achieved something leads to a mentee's perception that mentoring helped her achieve. While this direction of causation is inverse of what one might expect, we can not exclude this possibility. Future studies could address this topic in more detail.

Why have the different kinds of support no influence on a mentee's creativity? The answer might lie in the very nature of creativity itself. Metaphorically speaking, creativity does not mean to follow someone, but leave the beaten path, to go where experience does not help much. Furthermore, creative people simply might not be that interested in being supported. As they doubt and reject norms, question authorities, are dominant and self-confident (Feist, 2010), the idea of being mentored could be perceived as not fruitful or even harmful for the expression of own ideas and feelings. Indeed, Zuckerman (1977) reported that some Nobel laureates stated being dominated and deprived of intellectual and personal autonomy by their mentors.

The absence of positive impact of functions commonly discussed as relevant (see Kim & Zabelina, 2011 for a review) is a striking result, as it seems to contrast especially Torrance's research. His work (e.g. Torrance, 1984) was probably most influential in how mentoring is currently perceived in creativity research. However, our findings do not necessarily contradict the quantitative research by Torrance (1981, 2002), which reported positive effects of mentoring *per se* on creative achievement. It might actually be the tensions that cause this quantitatively found effect. On the other hand, our result seems to contrast the qualitative parts of Torrance's

study (Torrance, 1980, 1983, 2002). More specifically, the open response part in his study suggested that mentoring functions like emotional support (being encouraged and praised) or role modeling are responsible for beneficial effects of mentoring. However, participants also reported a number of less positive characteristics of mentors, although Torrance did not actively ask for them in a systematic manner: “ambitiousness, compulsivity to work, critical judgment, dominating or intimidating manner, lack of empathy, lack of future orientation, high standards, hypocrisy, intolerance of the ideas of others, inflexibility, perfectionism, and trendiness” (Torrance, 1983, p. 15). Thus, participants reported positive *and* negative experiences (similar to the present study). While it seems reasonable to attribute the positive effects of mentoring to positive mentoring experiences, one cannot be sure what aspect of mentoring had have effects on creativity in his study.

Another possible explanation for differences between Torrance's and the present study might be the focus on creative achievements from different fields. In his book, Torrance (2002) listed the frequency of reported achievements. For example, the two most common achievements were “conducted in-service education or training for co-workers” (62 of 101 participants at least one time) and “suggested modifications of existing practices or policies which were adopted by superiors and/or co-workers” (63 participants at least one time). Such activities are listed neither in the CBI, nor in the CAQ, which were applied in the present study. On the other hand, only one person from Torrance's sample had won one or more prizes or awards for their written work. In contrast, a detailed analysis of individual CAQ scores in the present study revealed that 60 participants in our sample had done so. Similarly, 27 participants from our sample won at least one prize at a juried art show, while three had received one or more award or prize for work in

art in the sample by Torrance. Accordingly, Torrance's research might give insights in the benefits of mentoring for not genuinely creative achievement.

In summary, it is important to note that not social interaction in general is the crucial point in mentorships (or collaborations) as argued before (John-Steiner, 1992). Rather, the present results indicate it is a certain quality of interaction which is important. One should, however, consider that “although some level of conflict helps new ideas and syntheses to emerge, too much conflict undermines a positive working environment, resulting in rumors, gossip, and destructive competition.” (p. 76, Acar, 2011). Specifically for mentoring, difficulties exist on a continuum where some relationships are marginally effective, some are ineffective, and others are truly dysfunctional (Ragins, Cotton, & Miller, 2000).

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Table 1. Loading of items on different factors

	Ps	Sk	Te	Ca	Rm	Adapted from
I served as a source of emotional support for this person.	.82					(1)
I considered this person to be a friend.	.82					(2)
We talked together and shared ideas.	.77					(1)
We shared a lot of interests in common.	.76					(1)
I exchanged confidences with this person.	.74					(2)
I shared personal problems with this person.	.70					(2)
This person was fun to be with.	.66					(1)
This person gave me emotional support, security, and encouragement.	.43				-0.36	(1)
I respected this person's ability to teach others.		-.80				(2)
I admired this person's ability to motivate others.		-.69				(2)
I acquired knowledge, information, or skills from this person.		-.62				(1)
When we did things, this person usually took the lead.		-.46			-.41	(1)
When we did things together, I usually took the lead.	.38	.45	.32			(1)
This person had some negative influence on me.			.81			(1)
This person and I would get angry at each other.			.80			(1)
This person had devoted special time and consideration to my career.				.86		(2)
This person helped me coordinate personal goals.				.83		(2)
This person took a personal interest in my development.				.51		(2)
I learned how to do things by watching this person do them.				-.34	-.74	(1)
I got a lot of my values from this person.					-.65	(1)
I tried to model my behavior after this person.					-.55	(2)
This person protected me from getting hurt emotionally.				.33	-.54	(1)
This person served as a role model of achievement for me.				.31	-.51	(1)

Note: Only loadings above .30 are shown. Items in bold were used for the respective subscales. For criteria on which items were selected for subscales, see text. Ps = Psychosocial support, Sk = advancing domain relevant skills, Te = Interpersonal tensions, Ca = Career-related support. Rm = Role-modeling, (1) Darling et al. (2002), (2) Castro et al. (2004).

Table 2. Correlations of mentoring functions with creativity measures

	Min	Max	M (SD)	1	2	3	4	5	6	7
Psychosocial (1)	7	35	25.4 (6.4)							
Role-modeling (2)	3	15	8.8 (3.2)	.36**						
Skills (3)	3	15	11.2 (2.8)	.25*	.60**					
Tensions (4)	2	11	5.3 (1.9)	.19*	-.11	-.17*				
Career (5)	3	15	10.7 (2.8)	.35**	.54**	.47**	-.04			
CBI (6)	3	87	40.4 (18.1)	.02	.03	-.02	.13	-.15		
logCAQ (7)	0	3.85	.97 (0.8)	-.04	-.05	-.08	.20*	-.02	.27**	
Autonomy (8)	5	20	16.5 (3.2)	.17*	-.11	-.10	.18*	.00	.44**	.18*

Note: $N = 161$, Skills = Advancing domain relevant skills, Tensions = Interpersonal tensions, Career = Career-related support, Autonomy = Creative autonomy

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

Table 3. Regressions for creative achievement on interpersonal tensions

Variable	Creative achievement							
	Model 1				Model 2			
	B	SE	β	p	B	SE	β	p
Interpersonal tensions	.06	0.03	.15	.05	.06	0.03	.16	.04
Covariates								
Openness	.05	0.01	.41	.00	.06	0.01	.42	.00
Extraversion	.01	0.01	.05	.54				
Agreeableness	.00	0.02	.01	.79				
Neuroticism	.00	0.01	.02	.75				
Conscientiousness	.00	0.01	.02	.81				
R^2		.22				.22		

Note: $N = 161$