

ORIGINAL ARTICLE

Examining the links between self-tracking and perfectionism dimensions

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BACKGROUND

Self-tracking – the collection, storage, analysis, and evaluation of self-related data (e.g., on one's diet, fitness activities, sports performance, or finances) – is a recent and widespread trend. Less is known about who engages in self-tracking. We expected perfectionism to be linked to self-tracking because performance optimization is central to this activity.

PARTICIPANTS AND PROCEDURE

A German convenience sample ($N = 145$; 64% women, mean age = 32 years) was recruited for this cross-sectional study. The sample comprised a mix of students and community participants. Participants completed an online questionnaire with scales on self-tracking (Self Quantification Scale), perfectionism (Multidimensional Perfectionism Scale with subscales striving for achievement and evaluative concerns), and personality (Big Five Inventory-10).

RESULTS

Using a two-dimensional conceptualization of perfectionism and controlling for the Big Five, we found that striv-

ing for achievement was strongly positively related to self-tracking, whereas evaluative concerns was not significantly linked. Apparently, people who set high goals and want to meet high standards are more likely than others to engage in self-tracking. However, people's engagement in self-tracking was independent of their personality.

CONCLUSIONS

The results point to the importance of distinguishing between different perfectionism dimensions in relation to self-tracking. Future research could explore additional performance-related traits (e.g., grit) to expand the understanding of self-tracking.

KEY WORDS

self-tracking; self-quantification; self; perfectionism; personality

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BACKGROUND

Increasing numbers of people are tracking their diets, sleep, physiology, exercise, work performance, and other parameters with smartwatches, wristbands, and other mobile devices. For example, 69% of the U.S. population and 66% of the Canadian population are tracking health-related parameters (Fox & Duggan, 2013; Paré et al., 2018). People usually use tracking to optimize themselves and increase their health and well-being (Johnson, 2022). Despite the prominence of some famous self-trackers (e.g., Benjamin Franklin rated himself every day on 13 virtues), less is known about who engages in such self-quantification and what the correlates of this activity are. Here, we examined the link between self-tracking and perfectionism while also studying relationships between self-tracking and broad personality traits.

Self-tracking is a new behavioral trend that describes the activities of collecting, recording, storing, and evaluating self-related data with mobile applications (Duttweiler, 2016; Neff & Nafus, 2016). Self-quantification – the interpretation of self-related data – can result from self-tracking (Maltseva & Lutz, 2018), but the two terms are often used interchangeably. The stage-based model of personal informatics can be used to describe self-tracking (Li et al., 2010). The authors equate personal informatics with self-tracking and distinguish the following phases: a phase of *preparation* is followed by *data collection*, *integration* (data preparation), and *reflection*, and the process typically ends with *action* (i.e., people choose what they are going to do with their new self-knowledge). These phases are iterative. People can be in different phases simultaneously, and in each of them, there are specific decisions to make and hurdles to overcome (e.g., deciding what information to collect and how to collect it; problems with the tool or one's motivation; technical challenges in integrating data; a lack of time or not understanding the meaning of the data; deciding what action to take).

Psychological research on self-tracking began only recently. Self-tracking has been empirically linked to conscientiousness, neuroticism, self-disclosure (Maltseva & Lutz, 2018), self-care, competitiveness, and performance pressure (Findeis et al., 2021). Moreover, self-tracking has been linked to self-reliance, health, and lower mortality (Abril, 2016). Self-tracking interventions can increase participants' sense of accomplishment and perceived physical health (Stiglbauer et al., 2019). Further, it has often been argued that a desire for performance optimization and improvement is a reason for self-tracking (e.g., Choe et al., 2014). Because of this reasoning, we assumed that perfectionism would be relevant for understanding the phenomenon of self-tracking. Perfectionism is defined as having extremely high standards and being overly critical in one's self-evaluations (Curran

& Hill, 2019). It is usually conceptualized as a two-dimensional construct: (a) *striving for achievement* encompasses high goal setting and standards as well as the desire to meet these standards, and (b) *evaluative concerns* include self-criticism and worry about negative performance evaluations (Burgess et al., 2016). Perfectionism has been found to be relevant in research on mental and physiological health as well as academic, workplace, and sports performance (Burgess et al., 2016; Curran & Hill, 2019).

Self-tracking is linked to conscientiousness and neuroticism, whereas conscientiousness is related to achievement striving and neuroticism to evaluative concerns (Smith et al., 2019). The stage-based model of personal informatics suggests that people need to overcome certain hurdles to track themselves successfully. Mastery and performance goals are related to perfectionism (e.g., Stoeber et al., 2008), and thus, it seems plausible to assume that self-tracking, which requires mastery, is also related to perfectionism. Furthermore, self-tracking may require perseverance and passion for long-term goals (i.e., grit; Duckworth et al., 2007), and grit is linked to achievement striving (Dunn et al., 2021), which is why a positive relationship between self-tracking and striving for achievement can be expected. Altogether, we assumed that perfectionism would be positively related to the perfectionism dimensions of striving for achievement (hypothesis 1) and evaluative concerns (hypothesis 2).

To identify the pure associations between self-tracking and measures of perfectionism, we controlled for sociodemographic variables (Johnson, 2022) and broad personality traits (Maltseva & Lutz, 2018). This research was therefore designed to expand the understanding of the associations between self-tracking and a two-dimensional conceptualization of perfectionism and to test for whether the personality correlates of self-tracking identified in prior research could be replicated.

PARTICIPANTS AND PROCEDURE

PARTICIPANTS

German-speaking participants were recruited via billboard posts, word-of-mouth recommendations, and university mailing lists. Participation was voluntarily, and no incentives were offered. Overall, 145 individuals (64% women, 36% men; $M_{\text{age}} = 32.36$, $SD_{\text{age}} = 15.13$, range: 17 to 82 years) participated in the online survey in their homes. Most of them lived in Southern Germany. The convenience sample comprised a mix of students and community participants. First, participants provided demographic data, followed by questionnaires about self-tracking, perfectionism, and personality. The survey took approximately 20 min to complete.

MEASURES

The Self-Quantification Scale. We employed the Self-Quantification Scale (Maltseva & Lutz, 2018) to assess self-tracking activities with five items (e.g., “I monitor my collected data regularly”). High reliability of the total score was found (Cronbach’s $\alpha = .92$; Maltseva & Lutz, 2018). In addition, we employed a list of self-tracking activities based on research by Balandis and Straub (2018). The list contained body states (7 items; e.g., heart rate, body weight), exercising (4 items, e.g., jogging, steps), behavior (12 items, e.g., consumed calories, sleep quality), and mental states (6 items, e.g., stress, well-being). We counted the number of tracked items in each of the four domains.

The Multidimensional Perfectionism Scale (Burgess et al., 2016) encompasses two subscales and assesses individuals’ level of striving for achievement (4 items, e.g., “I have extremely high goals”) and evaluative concerns (4 items, e.g., “The fewer mistakes I make, the more people will like me”). Good reliabilities for striving for achievement (Cronbach’s $\alpha = .85/.81$) and evaluative concerns (Cronbach’s $\alpha = .85/.83$) were reported as well as good model fit, extreme group validity, and satisfactory convergent and divergent validity (Burgess et al., 2016).

The Big Five Inventory. Further, we used the Big Five Inventory-10 (Rammstedt & John, 2007) to assess openness, conscientiousness, extraversion, agreeableness, and neuroticism (e.g., “I see myself as someone who gets nervous easily”) with two items each. The scale was reported to account for 70% of the variance in the original 44-item long scale. All subscales demonstrated good test-retest reliability and good convergent as well as criterion validity (Rammstedt & John, 2007). For all scales (except for the self-tracking activity list), responses were provided on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

RESULTS

Table 1 presents descriptive statistics, internal consistencies, and zero-order Pearson correlations between all variables. Self-tracking showed high reliability, and the perfectionism dimensions showed good reliability. The Cronbach’s α values for the Big Five were low but comparable to values from previous studies and in the expected range for broad constructs with only two items. However, as we computed group statistics, the low α coefficients were not a major concern. Self-tracking had small correlations with all variables except a high zero-order association with striving for achievement. In addition, the zero-order correlations between the self-tracking domains and the perfectionism dimensions showed that the number of tracked body states, exercising, and behaviors

were positively related to striving for achievement. In particular, exercising showed a large association with striving for achievement. By contrast, evaluative concerns were only very weakly related to the four domains. (Note that we interpret correlations of .10 as small, .20 as medium, and .30 as large; Funder & Ozer, 2019.)

Next, we examined model fit for the Self-Quantification Scale to assess its appropriateness for the present study. We computed a confirmatory factor analysis in Mplus 7 using the robust weighted least squares estimator (WLSMV). The following cut-offs indicate good model fit: RMSEA $\leq .08$ (Browne & Cudeck, 1993; see e.g., Boduszek et al., 2022); CFI and TLI $\geq .90$ (Marsh et al., 2004). The expected unidimensional factor solution showed good fit, $\chi^2(5) = 9.13$, $p = .104$; RMSEA = .075, 90% CI [.000, .152], $p = .243$; CFI = .999; TLI = .999. All loadings ($.92 \leq \lambda \leq .96$) were significant ($ps < .001$). Thus, the Self-Quantification Scale items measure a unidimensional self-tracking variable and can be seen as appropriate to be used in relation with other variables.

We computed a hierarchical regression model as the main analysis (see Table 2): The sociodemographic variables were entered in the first step. The model was nonsignificant and showed that age and sex barely explained any variance in self-tracking. In the second step, we entered sociodemographics and the Big Five traits. Again, this model was nonsignificant: personality traits explained little variance in self-tracking. The perfectionism dimensions were added in the final step. Supporting hypothesis 1, striving for achievement had a large effect ($\beta = .29$, $p = .006$). Evaluative concerns were not significantly related to self-tracking; thus, no support was offered for hypothesis 2. In total, the two perfectionism dimensions explained 7% of the variance beyond sociodemographics and personality. We replicated this finding with residualized scores accounting for the variance shared between the perfectionism dimensions: We regressed striving on evaluative concerns and vice versa. We saved the standardized residuals (see, e.g., Körner & Schütz, 2023, for this procedure). Controlling for sociodemographics and the Big Five, the coefficients for striving ($\beta = .31$, $p = .003$) and evaluative concerns ($\beta = .09$, $p = .381$) remained similar.

DISCUSSION

We examined associations between self-tracking, perfectionism, and personality. As expected, we found that striving for achievement was strongly related to self-tracking: People who set high goals and standards are more likely to collect and analyze self-related data. For them, self-tracking probably offers a way to monitor and optimize their striving for certain goals. The specific self-tracking activities that

Table 1

Descriptive statistics (mean, standard deviation), Cronbach's α coefficients (in diagonal), and intercorrelations of the variables

Variable	M	SD	ST	BS	EX	BE	MS	O	C	E	A	N	StrivA	EvalC
ST	1.88	1.14	.96											
BS	0.90	1.02	.52***	–										
EX	0.87	1.05	.66***	.46***	–									
BE	1.83	1.91	.57***	.49***	.47***	–								
MS	0.46	0.99	.14	.14	.12	.47***	–							
O	3.79	0.93	-.09	-.07	-.13	-.08	.12	.53						
C	3.64	0.82	.07	.11	.22**	-.01	-.15	.06	.40					
E	3.48	0.87	.08	-.07	.03	-.05	.03	.19*	.07	.69				
A	3.40	0.86	-.08	-.16	-.06	-.08	-.03	.16	.07	.17*	.55			
N	2.88	0.88	.06	-.02	-.06	.13	.13	-.01	-.04	-.24**	-.20*	.50		
StrivA	3.16	1.00	.28**	.10	.30***	.15	-.01	.13	.34***	.00	-.16	.01	.89	
EvalC	2.12	0.79	.12	.02	.04	.08	.06	.09	-.11	-.14	-.04	.38***	.36***	.75
Age	32.36	15.13	-.08	.20*	.00	-.15	-.11	.00	.33***	-.07	-.03	-.25**	-.08	-.28**
Gender (1 – women)	1.31	0.50	-.11	-.07	-.16	-.13	-.05	-.11	-.25**	-.08	-.07	-.14	-.06	-.08

Note. N = 132-145; ST – self-tracking behavior; BS – body states; EX – exercises; BE – behavior; MS – mental states; O – openness; C – conscientiousness; E – extraversion; A – agreeableness; N – neuroticism; StrivA – striving for achievement; EvalC – evaluative concerns; * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed).

Table 2*Results of hierarchical regression analysis with self-tracking behavior as criterion*

Predictor analysis	Self-tracking behavior		
	Step 1: β	Step 2: β	Step 3: β
Step 1			
Age	-.06	-.07	-.01
Gender	-.11	-.10	-.12
Step 2			
Openness		-.10	-.13
Conscientiousness		.06	-.07
Extraversion		.11	.13
Agreeableness		-.09	-.08
Neuroticism		.01	.04
Step 3			
Evaluative concerns			-.02
Striving for achievement			.29**
ΔR^2	.03	.07	28.00
ΔF	1.04	0.83	4.51*
Overall R^2	.02	.05	.11
F	1.04	0.60	1.68
df	2, 129	7, 124	9, 122

Note. $N = 132$; * $p < .05$, ** $p < .01$.

were most strongly related to striving for achievement were exercising (e.g., jogging, recording steps), which suggests that sport-focused performance goals might explain this link. Yet, body states (e.g., blood pressure) and behaviors (e.g., sleep quality) were also positively related to achievement striving. Contrary to hypothesis 2, evaluative concerns were not related to self-tracking. The self-criticism component of perfectionism has often been linked to poor mental health (Burgess et al., 2016) – by contrast, self-tracking can have positive downstream effects (e.g., Stiglbauer et al., 2019) and seems to be a distinct pursuit. Moreover, empirical evidence reviewed in the Introduction also provided a stronger basis for a positive link between self-tracking and achievement striving than for self-tracking and evaluative concerns. Our findings are in line with previous research that found that performance optimization (but not fear of meeting standards) was a reason for self-tracking (Choe et al., 2014). Our results show the importance of distinguishing between perfectionism dimensions when analyzing associations with self-tracking.

The results may also be relevant in light of the following two theories: First, with respect to the concept of action orientation (Kuhl, 1981), the results

suggest that self-tracking might be related to action orientation rather than to state orientation because we found that self-tracking was positively related to striving for achievement (i.e., showing a strong desire for action). By contrast, high state orientation is characterized by thorough deliberation and thus low action orientation (Hryniewicz & Borchet, 2019). It is related to fear of failure and may thus be related to the perfectionism dimension of evaluative concerns because evaluative concerns are characterized by extensive planning and inhibition. Thus, action orientation may moderate the link between self-tracking and perfectionism dimensions (i.e., strengthening the association with achievement striving and decreasing the association with evaluative concerns), an assumption that could be tested in follow-up research to show that self-tracking may be used for different purposes. Second, with respect to self-concept aspects, the results can also be related to the concepts of the real and ideal self (Rogers, 1995; for an overview, see Willmott et al., 2018). The positive association between self-tracking and striving for achievement suggests that people who self-track aim at self-improvement. Thus, self-tracking can be understood as a way to approximate the ideal self, and because

the real self is malleable and can be changed (Barnett et al., 2021), it could be argued that self-tracking is a tool that can be used to work on one's identity.

We did not replicate self-tracking's previously found positive links with conscientiousness and neuroticism (Maltseva & Lutz, 2016). In fact, no personality traits were related to self-tracking, thus suggesting that people's engagement in this activity is relatively independent of broad personality traits. Apparently, more narrow personality characteristics (i.e., achievement striving) are more relevant. Furthermore, the use of broader personality assessments may show more refined results and relevant links. The measure we used was designed to cover the Big Five traits efficiently. Thus, it does not represent all subdimensions. Future research could use longer scales to more thoroughly study the link between distinct personality features and self-tracking.

Future research could employ longitudinal designs or interventions to further clarify the direction of the relationship between self-tracking and achievement striving. Goals in self-tracking could be further distinguished. Moreover, including other performance-related traits (e.g., grit, locus of control, self-monitoring) and their relationships with self-tracking might explain additional variance and could stimulate future research in this emerging field.

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