FINDING HAPPINESS AT WORK

TOWARDS MEASURING HAW WITH OPEN-ENDED QUESTIONS IN THE IPPQ

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Master Thesis

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Abstract

Topic and relevance

Happiness at work (HAW) is a topic of interest for personal well-being and performance at work. To better understand HAW concepts and their correlations, different models, such as the 5C model focused in this research, are required to gain a multidimensional perspective on HAW.

Societal change implies that the concept of HAW is dynamic. As a result, a current view on the concepts of HAW for an accurate understanding of HAW is necessary in times of change. Consequently, the iPPQ and the 5C model on which this questionnaire is based need to be reviewed on their feasibility to measure and cluster the concepts and topics of HAW.

Accurate measurement methods are required to measure and understand the present perspective and degree of employees' happiness and guarantee the validity of the iPPQ questionnaire. Closed questions thereby dominate questionnaires used to measure social concepts; however, open-ended questions show a suitable alternative for these and need to be considered for the future of questionnaire research.

Aim

This research aimed to find how far the 5C model can be confirmed or extended with answers in open-ended questions in the iPPQ questionnaire. In specific, this includes what the developments in HAW are and what the potential of open-ended questions is for measuring the concepts of the 5C in the iPPQ.

Method

The research design included a pre and main study. In the pre-study, experts were consulted in a focus group on trends in HAW of the last ten years, and an interview was conducted with an expert on text mining with R on the potential of open-ended questions for measuring HAW. These findings were used to add to the theoretical framework to understand and analyze the conclusions of the main study.

The main study a data analysis including text mining methods in R to analyze answers given to open-ended questions from the iPPQ questionnaire was conducted. The dataset analyzed consists of n = 8950 respondents and includes data over the years 2017 to 2021. Text mining was used to generate topics that represent the answers from employees and individuals. These topics were further analyzed on their link with the 5C and compared between the years before Covid-19 and during Covid-19. In specific, the topics were compared on the change in relevance and content.

Results

This research showed that the answers given to open-ended questions could be transformed into topics that can be linked to the 5C and thus can measure the concepts related to HAW. In addition, these topics showed that events, in this case, the outbreak of the Covid-19 crisis, affect the relevance and content of topics people have for HAW in society. Thus, confirming the dynamic nature of HAW. Results show in this regard that the relevance and content of the

topics and concepts changed with the measures taken for Covid-19. The new emerging topics were not unknown but rather previously less focused topics that rose in relevance due to the circumstances of the crisis.

Open-ended questions showed in this research great potential to add to or even replace closed questions in questionnaires for measuring HAW. Specifically, for the iPPQ, answers to open-ended questions can be used to extend the range of topics that are measured and further add context to the information gained from employees.

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Introduction

Happiness is seen as an ultimate, or at least a highly valued goal in life (Diener, 2000; Frey & Stutzer, 2002), or as Frankl (1992) states it is a byproduct of pursuing higher goals. The conceptualization of happiness has a long history as already the old Greeks and Romans knew and discussed the concept of happiness as the quote of Cicero shows;

"That person, then, whoever it may be, whose mind is quite through consistency and self-control, who finds contentment in himself, and neither breaks down in adversity, nor crumbles in fright, nor burns with any thirsty need nor dissolves into wild and futile excitement, that person is the wise one we are seeking, and that person is happy" (Cicero, Tusculan Disputations 4.37, as cited in Sherman, 2005, p.xiv)

Happiness is a concept that has been discussed and defined over a long period including diverse elements. The definition of happiness in research is often based on Diener's definition of life satisfaction (Diener, Emmons, Larsen, & Griffin, 1985; Kislev, 2020; Michalos, 1985). Diener et al. (1985) define satisfaction as a cognitive judgmental process that evaluates satisfaction concerning one's circumstances and the individual's innate mood. As this evaluation of satisfaction is judged on an individual's cognition, it is also labeled as subjective-well-being. Happiness in the view of Tatarkiewiez results from satisfaction with the requirement that it is "complete satisfaction" (Michalos, 1980). Complete satisfaction means that happiness is based on satisfaction in life as a whole, and not only determined by particular experiences and situations (Michalos, 1980). Another definition is, by Veenhoven (1988) who understands happiness as "the degree to which individuals judge their life more or less favorable" (Veenhoven, 1988, p. 334). Happiness is also described as having a pleasant life and experiences, engagement in satisfying activities, and having a meaningful life in sight of achievements and virtues (Seligman, 2002). In context of defining happiness it also needs to be accounted for that people have different ideologies and therefore interpret happiness differently. These ideologies that people have are related to regions, countries, cultures, and religions (Diener, Lucas, & Oishi, 2018). Based on the different definitions above the following definition is a summary of the main elements of happiness.

Happiness is an individual's cognitive evaluation of their experienced satisfaction in particular domains and satisfaction in life as a whole.

Happiness in life can be further sub-divided on several domains as named in the definition of happiness. These domains influence each other, an example is the spillover effect between wellbeing in work and life. Of specific interest for this research is the domain work, since work is where a majority of the people will invest most of their time and energy in life. The concept of happiness at work (HAW) and how to measure HAW, are therefore topics in many studies.

According to Youssef and Luthans (2007), HAW refers to the extent to which individuals experience positive effects and satisfaction at work. In addition, Fisher (2010) also

refers to HAW as pleasant judgments and experiences at work. These definitions show that it can be defined similar as happiness just specified for the work domain.

Happiness at work is an individual's cognitive evaluation (judgement) of their experienced satisfaction (positive experience) at work.

At the core to happiness theories are the hedonic and eudaimonic perspectives. The hedonic perspective on the concept of HAW sees happiness as the affective experience from work or what the work is associated with (Weiss, Nicholas, & Daus, 1999). It includes fluctuating elements, such as emotions and feelings of a person. This hedonic element can therefore be described as a psychometric category of well-being (Fisher, 2010). In contrast, the eudaimonic perspective emphasizes the significance and importance of the work, with the concepts of purpose and meaningfulness (Steger & Dik, 2010; as cited in Bassi, Bacher, Negri, & Fave, 2013).

To understand an individual's happiness at work, the words happiness and individual (a person) need to be explained first. A person is defined by his or her characteristics (Putman, 1998). The articulation of these characteristics is found in the person's actions to which Putman (1998) refers to with the concept doing. Doing includes the domains of being, belonging, and becoming (Putman, 1998).

As a result, three domains of well-being at work are emphasized in literature (Guest, 2017), the psychological domain, physical domain, and social domain. These domains are linked with an individual's experience, judgment, and resulting behavior.

For this study the model of 5C's by Price-Jones (2010) that builds on the 3B's of Putman are central since the analysis of this research includes a dataset of the iPPQ questionnaire that is based on the 5C model. This leads to three questions. The research question how in specific the open-ended questions of the iPPQ confirm or extend the 5C model; and two sub questions, what can be learned over the answers on the open-ended questions by using the 5C model; and in how far the topics named in the answers are explained by the 5C model or by other concepts that are not included.

RQ: How do the open-ended questions in the iPPQ confirm or extend the 5C model on HAW?
SQ1: What do we learn of the 5C?
SQ2: What topics fit the 5C model and what can be explained by other concepts?

HAW is a dynamic concept, "most philosophers and historians agree that the concept of happiness has changed over the years" (Diener, Lucas, & Oishi, 2018, p. 14). Happiness as a human emotion fluctuates due to events that happen every day. Since organizations and work conditions change over time, this also applies to HAW. The current covid-19 crisis is such an event that influences the work circumstances, raises uncertainty in the workforce, and therefore impacts happiness at work; Resulting in the question if new structures or concepts of HAW emerged over time, especially during the covid-19 crisis.

SQ3: Do we see new structures or concepts in answers on the open-ended questions in the crisis?

Next to understanding the concept, understanding how happy individuals are at work, the concept of HAW and elements that constitute it are of interest. Measuring of the concept is necessary for this. Since the concept of HAW is assumed to change over time, especially with larger events such as crisis situations, it is even more relevant to research these changes, necessitating measurement of HAW, to actualize the understanding of the concept and keeping it up to date. This research therefore raises the questions how useful the use open-ended questions for measuring social concepts such as HAW is; and what the potential of open-ended questions is to measure HAW?

SQ4: What is the usefulness and potential of open-ended questions for measuring HAW?

For a better understanding of HAW and valid measurement of HAW with the use of open-ended questions, the theory on HAW and the utilization of open-ended questions for measuring HAW in the iPPQ are researched in the following. For the purpose to answer both the research and sub-questions introduced above, a pre-study with a focus group on trends in HAW over the last 10 years and Covid-19, and an interview on the potential of text mining and working with open-ended questions, have been conducted to support the analysis of the dataset and interpretation of results.

RQ: How do the open-ended questions in the iPPQ confirm or extend the 5C model on HAW?
SQ1: What do we learn of the 5C?
SQ2: What topics fit the 5C model and what can be explained by other concepts?
SQ3: Do we see new structures or concepts in answers on the open-ended questions in the crisis?
SQ4: What is the usefulness and potential of open-ended questions for measuring HAW?

In the next chapter, the theoretical background for HAW, measurement scales for HAW, open-ended questions, and the open-ended questions of the iPPQ will be discussed. Followed by a chapter on the method used for this research, a chapter on the results found in the research and the discussion and conclusion of this research.

Theoretical Framework

The 5C model and other concepts on HAW

In the following several concepts are briefly presented that have been found in literature to explain and describe HAW. These concepts of which HAW consists are often similar and overlapping but can be seen as distinct concepts as well (Spreitzer & Porath, 2014). The interrelatedness of the concepts shows the complexity of the concept of HAW. For example, this interrelatedness of concepts is shown in thriving and positive feedback, both lead to confidence (Spreitzer, Sutcliffe, Dutton, Sonenshein, & Grant, 2005), but thriving and feedback can also directly be drivers for motivation, thus affecting conviction as well. In the same way, confidence and conviction drive engagement and lead to higher contribution. Therefore, these different domains and concepts should be seen as interrelated that together build the concept of happiness.

At the core of this research is the model of the 5C by Price-Jones (2010). These includes the concepts contribution, conviction, culture, commitment, and confidence and additionally the concepts of, achieving potential, trust, recognition, and pride. The 5C model is thereby based on research with Putman's (1998) 3B's, being, becoming, and belonging.

Next to the 5C's several other concepts have been found in literature that are related with HAW (see Table 1). these concepts are also related to the 5C as most of these can be linked to one or more of the 5C's as sub-domains that constitute the 5C's. It still raises the question in how far the 5C are able to explain all the answers given from employees on HAW, or if other concepts and topics arise that are not covered by the 5C model and the topics found in this theoretical framework as suggested with SQ2.

Table 1

Concepts of HAW in literature

Concept	Definition	Link to HAW based on definitions*	Elements	Relation to 5C
Contribution (part of 5C)	Contribution refers to what employees put into the work, from the inside-out, and what others provide to work outside-in (Pryce-Jones, 2010).	Experiences and feelings from investing time, energy, and results of work and actions and being invested in by others.	*Inside-out*: achieving one's goal, having clear objectives, working on important things for oneself, security at work; *outside-in:* being listened to, receiving (positive) feedback, respect from superiors, being appreciated (Lutterbie, 2018; Pryce-Jones, 2010).	It is a core concept of the 5C.
Conviction (part of 5C)	Conviction is the driving force that leads people towards contribution (Pryce-Jones, 2010).	Experience and feelings (emotions and resilience) that influence the will towards the work process and goals.	Motivation at work, belief in once efficiency and effectiveness at work, resilience towards adversities, (positive) Impact of personal work (Lutterbie, 2018; Pryce-Jones, 2010).	It is a core concept of the 5C.
Culture (part of 5C)	Culture relates to the personal fit towards the work environment and how this environment fits with personal working preferences (Pryce-Jones, 2010). Culture includes two aspects at work. Cross-Cultural differences between countries, on the one hand (Hofstede, 1080, 1985), and the organizational culture related to the organization's structure and goals, that create an organizational identity and belongingness (Proctor, 2014).	Experiences and feelings from the work environment concerning the personal fit with the organizational culture and intercultural elements and experience of how an organization is managed and provides resources.	*Cross-Cultural dimensions:* Individualism vs. collectivism, uncertainty avoidance vs. risk-taking, power distance/power distribution, masculinity vs. Femininity (Hofstede, 1980, 1985), *organizational culture:* management style, communication (in all directions), open communication, organizational values (Proctor, 2014), liking the job, liking colleagues, (appreciation of) org. values and norms, control over tasks (Lutterbie, 2018; Pryce-Jones, 2010).	It is a core concept of the 5C.
Commitment (part of 5C)	Organizational commitment relates to the personal fit and attachment towards the colleagues, tasks, vision, and organizational goals (Judge, Kammeyer-Mueller, Weiss, & Hulin, 2017; Meyer & Allen, 1991; Price-Jones, 2010).	Experiences and feelings related to interactions with colleagues and feelings of the fulfillment of tasks and work process.	Positive emotions, meaningfulness, the purposefulness of work/tasks, interest in the job, believing in the vision and goal of the organization, respect of colleagues (Lutterbie, 2018; Pryce-Jones, 2010).	It is a core concept of the 5C.
Confidence (part of 5C)	Confidence relates to gained experiences that result in self-belief (Pryce-Jones, 2010).	Experiences and feelings of the self (personal growth and ability).	Sense of getting things done, knowledge, skills, experiences, self-control, achieving potential, fit to own expectations, the intention of recommending and staying at the job (Lutterbie, 2018; Pryce-Jones, 2010).	It is a core concept of the 5C.

*Working definition on HAW: Happiness at work is an individual's cognitive evaluation (judgement) of their experienced satisfaction (positive experience) at work.

Table 1 (continued)

Concept	Definition	Link to HAW based on definitions*	Elements	Relation to 5C
Becoming	Becoming is a process in which "a person's identity and personal characteristics are works in progress" (Putman, 1998, p. 16), leading to a new version of one's being.	Experience and feelings on personal development towards a role (including skills and knowledge) at work.	Once actions, perspective, and perception on oneself, treatment by others and how others see you, requirements of the situation (Putman, 1998).	It is a core concept of the 5C.
Being	Being is substantially more than the mere existence and summary of actual and possible actions of a person (Putman, 1998).	Experience and feelings concerning the self (the role one plays in the organization and what one does at work).	Consciousness, feeling, role vs. authenticity, self, capacity, characteristics, identity (Putman, 1998).	It is a core concept of the 5C.
Belonging	A particular status and role as in being and becoming can grant a place in the group as well as society at large (Putman, 1998)	Experience and feelings of being part of the organization and connecting with others at work.	Authenticity vs. restrictions of role and status (being yourself, vs. belonging), taking perspectives and identity of organizations or groups, involvement, satisfaction from participation (Putman, 1998).	It is a core concept of the 5C.
Pride	The perspective on how the organization impacts an employee's pride includes evaluating one's status and respect gained from an organization (Tyler, 1999; Tyler & Blader, 2000). Respect relates to how colleagues and superiors express their acceptance, appreciation, and value of the individual employee.	Experience and feelings that result from work (results, meaning of work, interactions with others concerning work).	quality of work, sense of dignity, sense of value (Welander et al., 2017)	It is related to all 5C as an emotion that can impact HAW.
Recognition	Recognition as an essential component of motivation (Brun & Dugas, 2008) refers to acknowledging what a person (employee) does for the organization or process (Pryce-Jones, 2010).	Experience and feelings that arise from other's interaction with oneself.	personal recognition, recognition of work practice, recognition of job dedication, recognition of results at work (Brun & Dugas, 2008)	It is related to all 5C as a cause for experiencing feelings of HAW from one's value for the organization.
Trust	For the work context, trust can be defined as "a state of favorable expectations" in both ways from the superior of the employee and vice versa (Möllering, 2001, p. 404).	Experience and feelings that arise from the trust (empowerment by employer or expectations towards the employer)	employment relationships (Guest, 2017), support, uncertainty avoidance (Tastan, Kucuk, & Isiacik, 2020)	It is related to all 5C as a feeling that can impact HAW.

*Working definition on HAW: Happiness at work is an individual's cognitive evaluation (judgement) of their experienced satisfaction (positive experience) at work.

Table 1 (continued)

Concept	Definition	Link to HAW based on definitions*	Elements	Relation to 5C
Achievement/ achieving potential	Achievements are found in literature as achieving potential (Pryce-Jones, 2010) or reaching potential in the context of work (Kaplan, 2016). It refers to the satisfaction and fulfillment of ambitions in once career and its match towards the work and development opportunities (Kaplan, 2016).	Experience and feelings of fulfillment from achieving one's potential.	innovation, advancement, reaching goals, getting rewarded (e.g., getting incentives, Celebrate), feeling energized, use of one's strength, learning new skills, overcoming challenges (Pryce-Jones, 2010; Slavin et al., 2012)	It is a result of elements of all 5C's that impact self-fulfillment.
Affect from work	Affect from work relates to experiencing positive emotions from work (Singh & Aggarwal, 2018).	Positive experience and feelings from work (in general).	reduce stressors, raise resilience, expressing enjoyment such as smiling (Singh & Aggarwal, 2018; Slavin, Schindler, Chibnall, Fendell, & Shoss, 2012)	It is mainly linked to commitment as a form of feelings towards work.
Decent Work	Decent work represents the standards that it should fulfill *(Duffy, Diemer, Bluestein, & Autin, 2016*).	Characteristics of the work needed to experience and feel the fulfillment of basic needs that work should fulfill, to be content with work.	work standards: dignity, equality, fair income, safe working conditions (ILO, 2021); *decent work standards influence:* survival needs, social connection needs, self-determination needs (Duffy et al., 2016)	It is mainly linked to culture since it has to do with work characteristics resulting from the organization's management.
(Work) engagement	Work engagement is defined (Schaufeli et al., 2002, p. 74) as a "positive, fulfilling, work-related state of mind."	Experience and feelings from the afford that one invests into work, work atmosphere, and work environment.	vigor, dedication, absorption, learning and experience, opportunities to be engaged by reduction of not valued work (Borst, Kruyen, Lako, & de Vries, 2020; Schaufeli et al., 2002; Slavin, Schindler, Chibnall, Fendell, & Shoss, 2012)	It is mainly linked to commitment since it represents the personal investments (energy, time) into the work.
Flow	Flow is represented by feelings of being absorbed in one's work (Fischer, 2010).	Experience and feeling during the process of working.	peak enjoyment, energetic focus, creative concentration, work enjoyment (Bakker, 2008; Fisher, 2010; Singh & Aggarwal, 2018)	It is mainly linked to conviction and commitment regarding a person's state that is a driving factor in work and how intensive a person is focused in the work process.

*Working definition on HAW: Happiness at work is an individual's cognitive evaluation (judgement) of their experienced satisfaction (positive experience) at work.

Table 1 (continued)

Concept	Definition	Link to HAW based on definitions*	Elements	Relation to 5C
Job satisfaction	Job satisfaction is defined as a positive (or negative) evaluative judgment an individual makes about his/her job or job situation (Weiss, 2002).	Experience and feelings towards the fulfillment that work gives.	*Personality traits:* neuroticism, extraversion, openness to experience, agreeableness, conscientiousness (Weiss, 2002), *related domains:* autonomy, work content, communication, financial rewards, growth/development, promotion, co-workers, meaningfulness, supervision/feedback/recognition, workload, work demands (Van Sanne, Sluiter, Verbeck, & Frings-Dresen, 2003)	It is related to all 5C since it results from the evaluation of experience and feelings towards elements of the 5C.
Job security	Job security refers to policies (such as restrictions on hiring and firing of employees) against labor market risks and is also seen as a need or hygiene factor that give employees a sense of assurance to remain employed (Clark & Postel-Vinaz, 2009)	Experience and feelings of safety and support from the organization so that work can be done to the best of one ability.	safety needs, survival needs, Job satisfaction, performance (Hur & Perry, 2016)	It is mainly related to culture and confidence since it is part of organizational management and affects to the individual state.
Meaning and meaningfulness at work	Meaning at work results from making sense of something (Pratt and Ashforth, 2003 in Rosso, Dekas, & Wrzesniewski, 2010), such as a task or process at work and what these signify for the role once work plays for the organization and oneself.	Experience and feelings towards the process, content, and goal of the work.	values, motivation, the richness of work, beliefs on the role or function (Rosso, Dekas, & Wrzesniewski, 2010; Slavin et al., 2012)	It is mainly included in commitment, leading to HAW to feelings of fulfillment on the process, content, and goal of tasks.
Relationships at work	Relationships at work relate to the experiences regarding colleagues and superiors as well as the team aspects at work (Singh & Aggarwal, 2018; Slavin et al., 2012)	Experience and feelings towards colleagues and superiors.	Opportunities for meaningful and purposeful relationships, interdivisional/interdepartmental activities, teamwork, team culture (Singh & Aggarwal, 2018; Slavin et al., 2012)	It is mainly included in culture and commitment regarding connecting with others leading to HAW.

*Working definition on HAW: Happiness at work is an individual's cognitive evaluation (judgement) of their experienced satisfaction (positive experience) at work.

Table 1 (continued)

Concept	Definition	Link to HAW based on definitions*	Elements	Relation to 5C
Spirituality at work	Spirituality refers to a human-centered view that is based on self-awareness, life purpose, and community engagement and affects the experience at the workplace (Bella, Quelhas, Ferraz, & Bezerra, 2018)	Experience and feelings resulting from the mind and mental self towards work.	*inner life:* values (interpersonal), identity (intrapersonal), belonging (institutional); *purpose: m*eaning (interpersonal), cohesion (intrapersonal), coherence (institutional); *community:* connection (interpersonal), climate (intrapersonal), environment (institutional) (Bella, Quelhas, Ferraz, & Bezerra, 2018)	It is mainly linked to commitment and confidence since it influences a person's state.
Thriving and vigor at work	Thriving and vigor at work relate to the experience of a sense of vitality and a sense of learning at work, resulting in personal development and health (Spreitzer et al., 2005). Vitality holds the meaning of aliveness (Nix, Ryan, Manly, & Deci, 1999, as cited in Spreitzer et al., 2005), and learning is the sense of acquiring and applying knowledge and skills (Dweck, 1986, as cited in Spreitzer et al., 2005; Elliott & Dweck, 1988, as cited in Spreitzer et al., 2005)	Experience and feelings of being energized by achieving something, or the process to achieving something at work.	*Agentic Work Behaviors,* task focus, exploration, heedful relating, *experience,* vitality, learning (Spreitzer et al. 2005), *actions from organizations to support thriving at work:* provide safety, provide fortification, assisting reconstruction, assisting reframing/ redefining (Feeny & Collins, 2015,	It is related to all 5C since it is a form of a person's state that either result from the 5C or describe the characteristics of the 5C.
Workplace hygiene	Workplace hygiene relates to the perception of a safe workplace and supportive work atmosphere (Singh & Aggarwal, 2018).	Experience and feelings of being in a decent (comfortable, clean, functional) work environment.	save the environment, structured vs. chaotic (Singh & Aggarwal, 2018)	It is mainly related to culture, commitment, and confidence since it involves the circumstances at the workplace and influences and shows the state of a person.

*Working definition on HAW: Happiness at work is an individual's cognitive evaluation (judgement) of their experienced satisfaction (positive experience) at work.

Measuring happiness at work

Happiness can be gauged by directly asking how happy people are, which is somewhat subjective. It also can be inquired more indirectly. These indirect means are inquiring on the antecedents and moderators of HAW as well as variables of the outcomes of HAW. The measurement of these variables is based on the continuum from negative to positive evaluations. Nevertheless, inquiring on happiness is often focused on the positive side of the continuum.
Given the complexity of the concept of happiness at work, measuring HAW focuses on different concepts of HAW. Questionnaires are used for self-reporting to items of these concepts by individuals both using scaled items and open-ended questions. Over the last century, several questionnaires have been designed that cover different aspects and domains of what constitutes happiness and happiness at work. Mostly scales from previous research are used for the practical reasons that they are already validated, it needs less afford than inventing a new one, and results can be directly compared with previous research that used the same scales. Nevertheless, these scales also have been adjusted or updated over time as well. in particular subjective well-being has been measured mainly with simple self-reports (Diener, Lucas, & Oishi, 2018).

For a brief overview on measurement tools that relate to happiness at work table 2 shows different scales, with the diverse concepts that are used to measure elements of HAW and well-being. These examples include the PANAS-X, which measures the specific, distinguishable affective emotional states in individuals (Watson & Clark, 1999), the Job Content Questionnaire (Karasek, 1979) that measures critical workplace issues, the EHHI on information on happiness, goals, and meaning within major life domains (Fave, Freire, Vella-Brodrick, & Wissing, 2011; Fave et al., 2017), the Job Diagnostic Survey (JDS) by Idaszak and Drasgow (1987), the Gross National Happiness Indicator (GNH) measures happiness on a the national level (Kassin, Fein, & Markus, 2016), or the work meaning inventory (WAMI) or more actual the meaning of work scale based scale , that focuses on the subjective experience of meaning in work (Arnoux-Nicolas, Sovet, Lhotellier, & Bernaud, 2017; Steger, Dik, & Duffy, 2012) taking the diversity of the society into account, to name some of the existing scales.

While there are many scales in research of well-being there is also skepticism towards self-reports methods. Reasons for this skepticism are, that people might deceive themselves, or might be unwillingness to answer honestly (Diener, Lucas, & Oishi, 2018). These aspects should also be considered with the use of such scales.

Table 2

Items of scales for research of happiness at work

Questionnaire name and or topic of items	Items/domains	Article Authors
Demographics	Age, employment, ethnicity, gender, marital status, political affiliations, region, residential, environment	(Van Boven & Gilovich, 2003)

Job diagnostic survey (JDS, revised)/ job tasks	Autonomy, task identity, skill variety, task significance, feedback	(Idaszak & Drasgow, 1987)
Field Survey with Employees Across Jobs and Industries/ Job characteristics	Job description, job-related happiness, experiential versus material job type, involvement of the self with the good, perceived positive impact on others, job meaningfulness, appropriateness of the job type distinction	(Bastos & Basarde, 2020)
Positive Affect Negative Affect Schedule PANAS-X	General dimension scales, basic negative emotion scales, basic positive emotion scales, other effective states, time frame	(Watson & Clark, 1999)
Job Content Questionnaire	Skill/intellectual discretion, decision authority, job demands, exhaustion, depression, job satisfaction/ dissatisfaction, life satisfaction/ dissatisfaction, sick days,	(Quinn, Magione, Seashore, 1975, as cited in Karasek, 1979)
Eudaimonic and Hedonic Happiness Investigation instrument (EHHI)/ life domains	Work, family, standard of living, interpersonal relations, health, personal growth, leisure/free time, spirituality/ religion, community issue, society issue, life in general	(Fave et al. 2011, 2017)
Gross National Happiness Indicator (GNH)	Education, health, ecological diversity and resilience, good governance, time use, cultural diversity and resilience, community vitality, psychological well-being, and living standards	(Kassin, Fein, & Markus, 2016)
Meaning of Work inventory: Inventaire du Sens du Travail (IST)	Importance of work, understanding of work, direction of work, and purpose of work	(Arnoux-Nicolas et al., 2017)

Additionally, to skepticism to self-reported questions in scales, an old debate is ongoing about the use of either closed or open-ended question; in which closed questions have dominated psychological and social sciences (Friborg & Rosenvinge, 2013). Reasons for the domination by closed questions are the "quick-and-cheap" argument, the generally higher test score reliability, and standardization of data collection that allows for comparisons (Friborg & Rosenvinge, 2013). High internal consistency and moderately strong test-retest reliability have been found especially when multiple-item measures were used (Diener, Lucas, & Oishi, 2018). The avoidance of open-ended questions has been a result from the lack of these attributes (Friborg & Rosenvinge, 2013). This research is questioning this view, basing its research on open-ended questions and their use for measurement of concepts such as HAW, because of technological development that gives more possibilities to work with open-ended questions.

Open ended questions

An open-ended question also called open question, is a question that in which the respondent answers in his or her own words. (Popping, 2015) The answers to open-ended questions are in form of statements (Popping, 2015). These statements range from long and detailed to short answers of only digits or words.

Open-ended questions are a controversial topic in research because of their advantages and disadvantages. Friborg and Rosenvinge (2013) found in their research that open-ended questions provide more comprehensive and more in-depth information compared to standardized closed questions, while there are also more missing data. Also, codes from open-ended questions overlap only moderately with the codes from the closed questions (Popping, 2015). In their study, the benefit of using open-ended questions in addition to standardized questions was practically non-existing. Nevertheless, the use of open-ended questions shows added value, especially for sensitive topics (Friborg & Rosenvinge, 2013).

These catch information that is not seized by a closed question.

Types of open-ended questions

Poppin (2015) introduced three types of open-ended questions:

1. Technically open-ended questions; These questions include that participants have to fill in some digits or letters but no word or coherent text (e.g., digits of the year of birth).
2. Apparent open-ended questions; These questions require the participant to fill in words they selected from a given list in a self-completion format (e.g., a list of positive and negative emotions).
3. Really open-ended questions; These questions forward an answer by respondents that either is used for specification or argumentation.

The technically and apparent open-ended questions are, because of their nature, alternatives for closed questions, that are answered with a Likert scale (Popping, 2015). Really open-ended questions are, in contrast, useful for theory construction (Popping, 2015). In the rest of the article, open-ended questions will refer to as really open-ended questions that are answered with a text statement.

A challenge of open-ended questions is that they need to be specific to provide meaningful, interpretable data (Popping, 2015). This includes that the formulation has to unambiguous and guides the participant in answering the question in the wanted direction. Therefore, the question should be neutral, inviting to be answered, as short as possible, and correct questioning (Popping, 2015).

Different approaches exist on how to analyze answers to open-ended questions. First, the instrumental approach of text analysis; in this approach, the researcher ignores the authors' meanings in the texts by using a "fixed dictionary" of thematic codes (Popping, 2015). Second, the representational approach; in this approach, the researcher needs to develop dictionaries for themes first based on and reflect the text's content (Popping, 2015).

The role of computer algorithms is to take care of the coding in the instrumental approach. In contrast, computer algorithms are only a management tool in the representational approach, in which the coding is performed manually (Popping, 2015). An advantage of using

computer algorithms is that depending on the extensity of the coding library, the analysis of texts ignores idiomatic ambiguity (Popping, 2015).

iPPQ (questionnaire)

In context of measuring happiness at work this research is focused on a dataset from the iOpener people and performance questionnaire (iPPQ). The iPPQ is built on a theory-based model with underlying research (Edmunds, 2009; Price-Jones, 2010). This research is based on the three-component model of Being, Belonging, Becoming, by Dutton and Edmunds (2007), to capture the concepts and experiences of what employees need and what they understand under happiness at work (Edmunds, 2009). The results of the research that is at the core of the iPPQ, is the framework of the 5C's contribution, conviction, couture, commitment, and confidence that together with the concepts of pride, trust, and recognition, explain what employees understand under HAW and what they look for, to gain happiness at work.

The iPPQ consists of 75 questions, 18 of which are neither open-ended questions nor scaled questions related to personal information, demographics, and numerical values, and two open-ended questions (a list of all questions can be seen in Appendix A). This research focuses on the two open-ended questions of the iPPQ. These open-ended questions are focusing on the perception of what achievements are for employees and what they look for in a leader, that on one hand leads to happiness of the person leads to their potential as well as increases their performance.

Open-ended questions of the iPPQ

> Question 23 of the iPPQ:
> *What are three main things that make you feel like you are achieving your potential?*

> Question 24 of the iPPQ:
> *What are three main things you look for in a leader to enable you to perform at your* best?

In the debate over which measurement tools are suitable and the validity of these tools, in the fields of happiness, happiness at work, and research on well-being, includes the iPPQ. As it is based on the understanding and needs of the employees of organizations, it is of interest to see in how far answers on the open-ended questions of people about their work are still captured with the framework of the 5C today or if changes in society such as new types of jobs, changes in organizations and needs of employees result in a different framework. For this purpose, the answers on the open-ended questions of the iPPQ are suitable to see if the topics that are given by employees changed, and in how far these are in line with the framework on the 5C's.

Method

Research Design

In regard to study how open-ended questions of the iPPQ confirm or extend the 5C model on HAW, two exploratory studies with a qualitative research design have been conducted in form of a pre-study and main study. The pre-study included both a focus group on trends in HAW for the last ten years and developments during covid-19, with experts on HAW, as well as an interview on text-mining and the potential of open-ended questions for measurement of social concepts with an expert on text mining. The main study included the data preparation and analysis of answers to the two open-ended questions of the dataset from the iPPQ questionnaire that had been provided by the iOpener institute, and the interpretation of these results, to answer the related sub questions of this study.

Methodology pre-study

The focus group in the pre-study aimed to add additional relevant findings to the literature research on HAW in the theoretical framework, to enable a better and more in-depth analysis, understanding, and interpretation of the results of the dataset from the main study.

The interview aimed to get the view from an expert on the use of open-ended questions for measurement and how feasible this is with text mining methods similar to those that have been applied in this study.

Methodology pre-study

Method focus group

Purpose of the focus group

Next to the theoretical findings on HAW in literature the focus group of the pre-study added more praxis-oriented observations and experiences from social work with clients and guidance of organizations in regard to HAW while also linking it to the theory.

Design of the Focus group

The focus group on trends on HAW that have been observed and experienced by experts was in form a semi-structured discussion. It included a set of questions that were asked to the participants for the general line of the discussion. The setting for this focus group was online due to the measures that were in place because of Covid-19 and took place for two hours.

Technology and tools used for the focus group

Seven questions were provided for the participants to prepare for the focus group, which then have been used partly during the focus group. These questions include:

For contacting the focus group, the program Microsoft teams was used for an online conference with the participants and the moderator. Microsoft Teams allowed for the participants of the focus group to hear and see each other and to write information in the chat function of the program. In addition, it also allowed for video and audio recording of the focus group. For the transcription of the focus group the platform Amberscript was used together with Microsoft Word.

Participants and recruitment process for the Focus group

The group included one moderator (researcher) and three participants (experts on HAW). The criteria for the selection of who was invited was, that the experts for this focus group had to be knowledgeable about the concept of happiness, and this preferably also in the work context so that they could add their experiences and examples to the theory. Therefore, one of the participants had background in the scientific and academic field of HAW and two participants had background as coaches for individuals and organizations around the topic of HAW.

The selection of participants for the focus group has been approached with a mixed method, including elements of convenience, purposive, and quota selection. Convenience since participants that fit the purpose have been invited through an already existing network of experts on HAW, but also by means of search for organizations that specialize and fit requirements on guidance of organizations and individuals on HAW as well as quota since a minimum of three participants was set as requirement for the discussion.

Procedure of the Focus group and analysis

Before the focus group took place, the participants were informed on the topic and general questions, so that they could prepare in advance, to avoid non-responses during the discussion and to ensure the discussion to go into more depth.

Several questions and occasional follow up questions have been used to lead the participants to converse about developments and experiences made about the concept of HAW and its implementation for two hours, to gain in-depth understanding and knowledge on trends of HAW. To conclude the focus group the transcription was done mainly with “Amberscript” with a license from the university and partly in Microsoft Word. Amberscript is an online platform were audio and video files can automatically and manually be transcribed (possible in different languages as well). The video file of the focus group has first been transcribed by the program followed by manual transcription in the program and Word (see supplementary 2.1).

Topics that have been discussed in the focus group have been summarized and linked to HAW and the 5C model in table 3 in the results.

Ethical considerations for the focus group

An adequate informed consent from the participants was given for the use of the information gained from the focus group including a clear assessment of minimization of risks to participants and to the university approved by the ethical committee of the university.

Participants of the focus group were informed before participation about the purpose of the focus group and got a list of potential questions on topics that were relevant for the discussion. Since the focus group was recorded and transcribed participants were asked for their consensus that the information gained from the discussion was further used for the Thesis. These was done once when before they accepted the invitation to the focus group and a second time in the beginning of the focus group also included in the transcript. The participants were anonymized with “Participant 1, 2, 3, and 4” and the video recordings were deleted after the transcript was finalized.

Method interview

Purpose of the Interview

In addition to the theory found in literature on open-ended questions, the expert interview has been conducted to better understand how text mining can be used to analyze open-ended questions and what the potential of open-ended questions is for measurement of social concepts such as HAW. In addition, it was also of interest to better understand the possibilities of text analysis with R.

Design of the interview

In the interview a semi-structured approach has been used, since the interview was partly in form of a discussion on the best practices and ways to understand the usefulness of open-ended questions for measurement. For the general line of the interview a set of questions was asked to the participant on which he was invited to answer to the best of his knowledge. The setting for this interview was online due to the measures that were in place because of Covid-19 and took place for one hour.

Participant and recruitment process for the interview

The participants of the interview were the interviewer (researcher) and the interviewee (expert on text mining). The criteria for the interviewee was, that he had to be knowledgeable about methods of text mining and use of open-ended questions. Furthermore, he should be experienced with text mining as well.

The interviewee was chosen with a mix between convenience and purposive approaches. Convenience as the interviewee was consulted beforehand on analyzing of the dataset, due to which he was already slightly familiar with the study, and purposive since he worked on many text mining projects and therefore seemed to suit the requirements.

Technology and tools used for the interview

The interview was conducted such as the focus group with the program Microsoft Teams, allowing for the interviewer and interviewee to see and hear each other, while also video recording the interview and offering ways to share information in a chat function. To transcribe the interview the platform Ambersscript was used as well as Microsoft Word.

Procedure of the interview and analysis

Before the focus group took place, the interviewee was informed on the content and general questions, so that he could prepare in advance, to avoid non-responses during the discussion and to ensure the discussion to go into more depth similar to the focus group.

Several questions and occasional follow up questions have been used to lead the conversation with the interviewee for one hour, to gain in-depth understanding and knowledge on methods and feasibility of using open-ended questions for measuring social concepts such as HAW. To conclude the interview the transcription was done mainly with “Amberscript” with a license from the university and partly in Microsoft Word. Amberscript is an online platform were audio and video files can automatically and manually be transcribed (possible in different languages as well). The video file of the interview has first been transcribed by the program followed by manual transcription in the program and Word (see supplementary 2.2). Topics that have been discussed in the interview have been added in the discussion of results and its implications.

Ethical considerations for the interview

An adequate informed consent from the interviewee was given for the use of the information gained from the interview, including a clear assessment of minimization of risks to the participant and to the university approved by the ethical committee of the university.

Methodology main study

Purpose of the main study

In the main study a text analysis on the dataset from iOpener on answers to the open-ended questions in the iPPQ have been analyzed with R. Algorithms have been used in a script (description of R script, see Appendix B, script see supplementary 3. R scripts), to prepare and analyze the two open-ended questions of the iPPQ in R:

> Questions 23 in the iPPQ (open-ended):
> What are three main things that make you feel like you are achieving your potential?
> Question 24 in the iPPQ (open-ended):
> What are three main things you look for in a leader to enable you to perform at your best?

Data set and tools used for text analysis

For the data analysis with R both R and R studio were required. Furthermore, R also requires knowledge on programming with algorithms and the applied algorithms also called packages in R. Next to the program the dataset required for the analysis was provided by the iOpener institute. The dataset included responses to the iPPQ questionnaire from iOpener.

Analysis of the dataset

Design and Procedure of the text analysis with R

The analysis of the dataset in R included three steps. The first step was to prepare the dataset. Step two included generating and visualizing of tables and graphs for the analysis of the answers on the open-ended questions. The third and final step was to analyze the output from R. For the first and second step a script in R was written with algorithms provided by for the program, in the third step a manual analysis was done with interpretations on the output of R based on the theoretical framework and results from the pre-study.

Choice on R packages

Working with R requires algorithms that needed to be written in a script. Several R packages have been used to write the script (for a detailed description on the use and choice for packages see Appendix B). For this research, one major choice that impacts the results of this research has been made.

This choice relates to generating of the topic models. Topic models can thereby be generated in several ways. At its core are the methods of LSA and LDA (explained in the detailed description of the script, Appendix B). For this research “stm” has been chosen as the most suitable method to generate topic models as comprehensive guides were accessible and the method seemed to be suitable to analyze open-ended questions, while additionally allowing for further analysis, that were of relevance for this study and offer also several possibilities for further research on the dataset.

Criteria for the choice of K topics (choice for a suitable number of topics)

Three steps are used to determine the most suitable value K for the topic models.
First diagnostic values, the held-out likelihood, residuals, and the semantic coherence are used to determine a range of suitable numbers K for topics. For these the value of the held-out likelihood and the value of the semantic coherence should be as high as possible, while the residuals should be as low as possible (with focus on the held-out likelihood and semantic coherence). Ideally for this research the value K should be approximately 20 or lower explained with the third diagnostic.

In the second step the exclusivity of the topics and semantic coherence of the topics will be compared with those of different values for K that have been chosen in the first step. Ideally the topics of a number of K topics have high exclusivity and high semantic coherence, so that possibly different (exclusive) topics are generated, so that these topics have not much overlap, and the topics make sense as the words in the topics build a reasonable concept. This analysis also includes rejection of topics with high amounts outliers that are therefore less coherent in the quality of topics.

The third part, analyses the topics of a chosen K topics on their correlations between its topics. It is assumed that all generated topics belong to either elements of achieving once potential, or leadership that enables employees to work at their best, in regard to the question that was answered. Therefore, these topics belong generally together. Nevertheless, finer differences can be made. The more topics that are generated the more intercorrelated are the topics. This is because with higher values of K, topics generated present also small differences between topics. To get a better understanding on the distinct topics that appear in the answers, a lower number of k has been chosen as ideal as their topics are either single topics that are not directly correlated with others different clusters of topics that distinct from other topics and clusters. This research focuses on main concepts that occur in the dataset and not on the sub categories of the topics with each small

If a decision for a number of K cannot be made with the first two steps the two most suitable topic models in those, will then be compared in the third step (see in case of leadership 2020-2021).

Criteria of clustering in 5C's model

Two methods of clustering have been applied in this study. For the first method, the framework used for clustering the results from the topic modeling, are the 5C's that were also used in the iPPQ. This is done, to verify in how far the topics addressed are included in the 5C model or weather a different concept was measured with the open-ended questions.

These topics have been manually assigned to either one of these 5C's when it was possible. Each topic is presented as a list of 20 words which are ordered by importance of the words for the topic. As a criterion to determine to which theory the specific topic has been assigned, the first word of the topic was chosen as the defining term, while the following words have been used as terms that further explain the direction the first word (topic), and how it had to be interpreted.

Two perspectives have been applied for the interpretation of the topics. As several topics could be placed under more than one theory of the iPPQ framework, the output topics

(lists of words) have been looked at from the perspectives, which category fits the topics the most, and what question was answered.

The second method was used to further explore the topics and see if other concepts resulted from the dataset. For this purpose, correlations between topics have been analyzed. The output of this analysis has been taken and these clusters have been labeled.

Results

Results of the pre-study

Table 3

Topics that are related to HAW based on observations from experts on HAW (see table and transcript of the focus group Appendix F)

Concepts and topics	Explanation based on transcript	In transcript (in Dutch)	Related concepts of 5C based on content of explanation
Taking space (job crafting, trust, autonomy)	fulfilling what one needs and wants, (in addition to work, or shifting work in that direction, also having the possibility to do so)	"ruimte durven nemen", "vertrouwen", "autonomie" (Participant 2, personal communication, March 24, 2021)	Contribution, culture, commitment
Whish for acknowledgement and being seen	Being acknowledged by others. People want to be seen and heard.	"erkenning krijgen", "worden gezien", "gehoord voelen" (Participant 2 & participant 4, personal communication, March 24, 2021)	Contribution, conviction, confidence
High work pressure	More work and requirements that employees need to follow	"werkdruk.(…) is toegenomen", "dat je maar moet voegen" (Participant 2, personal communication, March 24, 2021)	Conviction
Possibilities for breaking out of chains of the system	Strict systems can lead to more pressure, stress, and maybe unnecessary steps in work processes (less or no innovation). Having a need for possibilities to step out of the system and adjust procedures (flexibility of procedures e.g. including in the system possibilities to work around the system if needed) for the individual situation are meant with possibilities for breaking out of the system.	"stapje om uit het systeem te breken", "daar word ik wel verdrietig van", "regelruimte", voorbeeld woongebouw: "dat je dus gewoon onderdeel van het systeem maakt, dat je om het systeem heen kunt werken" (Participant 2 & participant 3, personal communication, March 24, 2021)	Culture
Research focus shift on reasons for the importance of HAW from self-realization to justification	Literature show the trend that research on HAW focuses now more on justification of HAW than the origin that focused on self-realization. Justification: is based on contribution, viewed as leaving as bug as possible footprints in the final product that show your contribution (these are not things that represent oneself but rather quantitative values of one's effort) Self-realization: to see yourself in your work (it relates to the qualitative value e.g. emotions, ideas, values, energy and afford invested in the product or result)	Justification: "bijdrage", "dat jouw footprint zo groot mogelijk wordt" Self-realization: "dat ik mezelf in mijn werk herken" (Participant 3, personal communication, March 24, 2021)	Culture, commitment
Shift from the individual to the collective in regard to job crafting	Focus shifts from adjusting work to preferences and needs of oneself to preferences and needs of the group or organization	Shift: "individueel naar collectief" (Participant 3, personal communication, March 24, 2021)	Contribution, culture, commitment
Culture element in organizations	Culture elements in organizations can be for example events that burst the confidence and cohesion of employees, as well as relaxing activities. These are not always something people would do on their own but are mandatory due to policies of the organization. These activities change the behavior and atmosphere when working together, and are	"feestje (…omdat) ze hadden het target van die week van die maand gehaald", "en daarmee werd je daar ook in opgenomen" (Participant 4, personal communication, March 24, 2021)	Culture, commitment

	done because they work although people might not like them or are not convinced of them.		
Cohesion and bonding of people in organizations	Cohesion and bonding between employees at work. This goes even further than work and includes messaging and calling each other even on weekends and during work with probably more than 50 percent work unrelated information's (e.g. emoticons, short films), generating cohesion and bonds between employees.	"onderlinge samenhang, die verbinding", "bellen elkaar", "je ziet allerlei emoticons dan voorbijkomen, filmpjes", "In 50 procent van de gevallen gaat het helemaal niet over het werk" (Participant 4, personal communication, March 24, 2021)	Culture, commitment
Digitalization	Digitalization and related trends such as home office but also change of jobs and requirements due to digitalization will be long lasting. Also effect of social distancing on well-being might be an upcoming issue. But the latter is partly mitigated since technology offers many new possibilities due to new innovations.	"dat het ergens digitaal blijft", (Participant 4, personal communication, March 24, 2021)	All 5C
Connections	Connections will raise in importance. Reasons could be that due to the digitalization's more possibilities exist (e.g. technology is used to replace offline settings such as "raken maandag ochtent" as a meeting platform for Monday morning and a start in the week with every one of the organizations. Thus, new challenges arise for connecting with others (e.g. working with home office).	"volgens mij gaat het de komende tijd veel meer over connecting, verbinding en aandacht daarvoor", "raken maandag ochtend" (Participant 4, personal communication, March 24, 2021)	Culture, commitment
People are partly less inclined to do work with deeper meaning	There is a trend where people do deliver products or services, while when the delivery is done it counts as good but how it affects others and development of more in depths connections with the client and colleagues are not of interest (e.g. in case of care institutions). Thus, only the most necessary is done since the most relevant is the economic growth.	"dat er wordt gedacht als de ware opgeleverd wordt, is het goed", "hoe het verder met de mensen gaat, is niet belangrijk", "(alleen) de randvoorwaarden helemaal goed geregeld hebben", ", het gaat om de diepgang en werkgeluk", "het enige wat ze echt belangrijk vinden is dat er geld wordt verdiend" (Participant 2, personal communication, March 24, 2021)	Conviction, commitment
Motivation	Motivation as a hygiene factor means that certain factors are necessary to not demotivate people. Actions to motivate employees such as giving small presents, or activities in the organization for employees are only fulfilling the simplest elements to not demotivate them. In contrast really motivating someone goes deeper as it is related to reaching goals, having ideas, and having the feeling that one's work is a purposeful work. The trend shows that the most focus is placed on the former and the latter is neglected.	"Hygiëne factor", "moet aanwezig zijn om niet te demotiveren", "iets anders is echt motiveren", "dat je doelen bereikt, dat je het idee hebt, dat de kern van het werk een zinvolle bezigheid is" (Participant 3, personal communication, March 24, 2021)	Conviction

In the discussion in the focus group, several topics and movements (table 3) that are related to HAW, are named. That stem from longitudinal observations in practice of guiding work with people on HAW and from observations on research in the field of HAW. These findings suggest that HAW is a complex, ever-developing discipline. Its changing nature, is affected by societal and external factors such as the crisis of covid-19, development of technologies, and ideal and visions of organizational systems and preferences of individuals.

In total 12 topics and concepts that represent the trends and problems in HAW for the last 10 years have been found in the discussion of the focus group.

Results of the main study

Characteristics of the dataset

A dataset with answers on the questions of the iPPQ on performance and happiness have been given. Including answers of respondents from 2017 to 2021. The data includes answers to 75 questions with mainly scaled questions, several technically open-ended questions and two really open-ended questions that have been introduced. In this research only the date, of when the questions were answered, the language used to answer the questions, and the content of the open-ended questions have been used. The answers consisted of either single words, group of 3 to 5 words, or full sentences these resulted into characteristics of the data as shown in table 30.

Table 4

Numbers of responses and words used for analysis filtered per year

Year(s)	Open ended question on achieving your potential	Open ended question on leadership
Number responses total with answers on both questions	8950 responses	8950 responses
Number of responses total answers for the specific question	5683 responses	5683 responses
Number responses filtered for question and language (English) for years 2017-2021	2531 responses	2531 responses
Number responses filtered for language and years 2017-2020	1805 responses	1805 responses
Number responses filtered for language and year 2020-2021	725 responses	725 responses
Number words filtered for the years 2017-2021	11553 words total	9674 words total
Number words filtered for the years 2017-2020	8014 words total	6784 words total
Number words filtered for the year 2020-2021	3436 words total	2829 words total
Word diversity 2017-2021	1093 different words	899 different words
Word diversity 2017-2020	927 different words	796 different words
Word diversity 2020-2021	677 different words	490 different words

Number of K topics

The analysis on the number K topics that are the most suitable to represent the dataset table 5 result from a complex analysis (see supplementary 4 for the graphs on which basis the K value was determined). This analysis included diagnostic values on the held-out likelihood, residuals, semantic coherence and exclusivity (explained in the method of the main study). All the topic models chosen that best show the most relevant distinct topics from the answers in the dataset ranged from 14 to 23 topics. Larger models included many topics that only differed little from another due to some nuances.

Table 5

Resulting values for number of K topics

Year(s)	Achieving your potential at work	Leadership that enables employees to perform at their best at work
2017-2021	17 topics	19 topics
2017-2020	23 topics	15 topics
2020-2021	20 topics	14 topics

Categorization of topics with the 5C of the iPPQ

Table 6

Sample of the first topics for achieving your potential at work (for complete list of topics see supplementary 5.1 to 5.3)

Topic name proportion	Linked to	Explanation for link with 5C's, based on words included in the topic model
2017-2021		
Recognition 0.109	Contribution	a form of positive feedback and respect from others (outside in) or as a reward for completing task
	Confidence	accomplishment and qualifications that define accomplishments can raise the self-esteem
2017-2020		
Recognition 0.103	Contribution	from superior, for guidance
	Conviction	remuneration, thanks
	Culture	authority, bonus
	Commitment	for being involved, emotions and feelings, e.g. gratitude, recognition needs to be meaningful, for ones' perseverance, gratitude
	Confidence	self-esteem, e.g. qualifications
2020-2021		

Happiness 0.100	Contribution	goal happiness of others, e.g., staff, customers, children, succeeding
	Conviction	raises resilience, e.g., against stress, energizes
	Commitment	emotions and feeling, e.g., satisfaction, energized, friendship at work

Table *6* shows an extract from the clustering of topics, to the 5C's model on which the iPPQ is based, about the answers on achieving your potential at work. The words (answers) that are associated with the topics can be interpreted differently. This interpretation shows that the topics can all be associated to several and in many cases all the 5C's with few words that are difficult to interpret in the first 20 terms of each topic. These words are partly only applicable for one, and some are applicable for several of the 5C's.

Table 7

Sample of the first topics leadership that enables employees to perform at their best (for complete list of topics see supplementary 5.4 to 5.6)

Topic name	**Linked to**	**Explanation for link with 5C's, based on words included in the topic models**
2017-2021		
Trust 0.153	Contribution	appreciation, advice, thought (the way how a leader thinks about employees or vice versa), build through discussions and conversations
	Conviction	resilience, e.g. mental pressure, feeling stretch, motivation, e.g. compliments
	Culture	empowerment, authorization, independence, picture (reputation), balance (trust vs. control)
	Commitment	on mutual level
	Confidence	humor (being less strict and more relaxed)
2017-2020		
Support 0.155	Contribution	guidance, mentoring, advice, consideration, goal, e.g., stability
	Conviction	praise, potential
	Commitment	availability, belief, trustworthiness, friendly, straight forward
	Confidence	growth, needed
2020-2021		
Trust 0.178	Contribution	feedback, discussion, thought, enabling, mutual, speaking, push, execute, consultation
	Conviction	constructive, resilience, e.g. vulnerable, motivation, e.g. praise,
	Culture	power

	Commitment	maturity, enthusiasm, believe, openness, predictability, friendship, candor
	Confidence	maturity, skillset, predictability

Table 7 shows an extract from the clustering of topics, to the 5C's model on which the iPPQ is based, about the answers on leadership that enables employees to perform at their best. The words (answers) that are associated with the topics can be interpreted differently. This interpretation shows that the topics can all be associated to several and in many cases all the 5C's with few words that are difficult to interpret in the first 20 terms of each topic. These words are partly only applicable for one, and some are applicable for several of the 5C's.

Comparing relevance of topics between years

Table 8

Comparing top 7 topics on topics of achieving your potential at work compared over years

2017-2021	% of model	2017-2020	% of model	2020-2021	% of model
Recognition	10.9	Recognition	10.3	Happiness	10.0
Challenges	7.6	Learning	6.8	Recognition	9.2
Success	7.4	Feedback	6.2	Feedback	8.0
Results	6.7	Happiness	5.7	Learning	7.4
Feedback	6.4	Others	5.5	Others	5.7
Achieving	6.3	Development	4.8	Challenges	5.5
Happiness	6.2	Families	4.7	Results	5.2

Table 9

Comparing top 7 topics on topics of leadership that enables employees to perform at their best compared over years

2017-2021	% *of model*	2017-2020	% of model	2020-2021	% of model
Trust	15.3	Support	15.5	Trust	17.8
Support	14.4	Trust	14.1	Support	15.9
Knowledge	6.9	Communication	8.4	Communication	7.0
Communication	6.2	Encouragement	7.1	Encouragement	7.0
Clarity	6.1	Feedback	6.8	Respect	6.5
Encouragement	5.7	Work	6.9	Guidance	6.3
Feedback	5.5	Knowledge	6.1	Clarity	6.3

Tables 8 and 9 both show that the top 7 topics in both answers on achieving your potential and leadership that enables employees to perform at their best, are not equally relevant in 2017-2020 and 2020-2021. Topics thereby have different values for their weight in the years presented by the percentage values. These values are showing for how many percent a topic explains the model of HAW in the related year(s).

These changes in the rankings can be seen between the years before the covid-19 crisis and the first year of the covid-19 crisis. Additionally, the tables show that the topics in those years differ also from the generalization of the topics in all four years 2017-2021.

For answers to the open-ended question on achieving your potential at work during the period of the covid-19 crisis, the importance of the top 7 topics increased in how much they define the concept of HAW, except for recognition, communication, development, and families, that decreased in how often they are represented in the answers. Instead several topics rose in importance that have not been in the top 7 topics in 2017-2020. These topics are learning. challenges, guidance, and results.

For answers to the open-ended question on leadership that enables employees to perform at their best at work during the period of the covid-19 crisis, the importance of the top 7 topics increased in how much they define the concept of HAW as well, except for communication, encouragement, feedback, work, and knowledge, that decreased in how often they are represented in the answers. Instead several topics rose in importance that have not been in the top 7 topics in 2017-2020. These topics are respect, guidance (also not in 2017-2021), and clarity.

Comparing change of focus of content between years

Table 10 below shows that the focus of the topics during the covid-19 crisis changed for several topics although not fundamentally in all cases. The general trend for all the years also partly differs from the focus of the topics in the years.

Table 10

General focus and importance of the top 7 topics compared between years from answers on achieving your potential at work

Topic	Focus generally 2017-2021	% of model	Focus in 2017-2020	% of model	Focus in 2020-2021	% of model
Achieving	*Topic not defined**		Goals, expectations and potential	4.1	Self-development and growth	4.5
Development	Growth of ability's, feelings, and career	4.5	Personal growth, tasks, and feelings	4.8	*Topic not defined**	
Challenges	Feelings and type of challenge	7.6	Environment, direction of challenge and feelings	3.9	Working with others, feelings, and type	5.5
Families	Financial support, friends, and feelings	4.7	Balance between life and work family objectives	4.7	*Topic not defined**	
Feedback	By whom (also customers), evaluation, and cooperation	6.4	By whom (also customers), and its effect (on self)	6.2	Relationship with colleagues, tasks, and characteristic of feedback	8.0
Happiness	Its effect (feelings), who is or makes one happy, and what makes happy (rewards)	6.2	Who feels happy, and its effect (feelings)	5.7	Its effect (feelings), and who feels happy	10.0
Learning	From tasks, feelings, and disposition to learning	6.0	Growth, drive and motivation, and responsibility	6.8	Self, growth, motivation, and feelings and emotions	7.4

Others	Goals and contribution, competition, and support	5.7	Goals and contribution, quality of work, and teaching and support	5.5	Support, contribution, impact, connecting, and value (potential)	5.7
Results	Rewards (actions of others), for what, and effect (motivation and behavior)	6.7	Behavior at work, contribution, evaluation, recognition	3.9	Rewards (acknowledgement), feelings and motivation, and behavior	5.2
Success	Who (team), with what, and investment (time)	7.4	Contribution and measurement of them, fulfilling own needs, and rewards	4.1	With work (tasks), evaluation, appreciation	4.8

* in the models that are created for this study this topic is not explicitly included it might be in a model with fewer or more topics, or topics of its elements are more explicitly defined as topics.

Changes in the focus of the topics before and during the covid-19 crisis show significant changes in challenges, from environment and direction of challenges towards mainly challenges in working with others. Focus of feedback, changed from who gives feedback and its effect on the recipient, to relationships with colleagues, feedback on tasks, and the characteristics of the feedback. The focus in the topic of learning changed from responsibility to feelings and emotions related to learning. For the topic others, the focus changed to connecting with each other, impacting others or their impact, and their value rose in relevance. The topic results, is less focused on evaluating and more focused on its rewards in form or acknowledgement by others. The focus on success also changed from fulfillment of needs and rewards to appreciation by others. The explicit topics on development, and families lost in relevance as these are not defined in the topics in 2020-2021. Lastly the focus in the topic of happiness did not change significantly.

Table 11 below, shows too, that the focus of the topics during the Covid-19 crisis changed for several topics although not fundamentally in all cases. The general trend for all the years also partly differs from the focus of the topics in the years.

Changes in the focus of the topics before and during the covid-19 crisis show significant changes in the topic of clarity, away from clarity what is contributed such as who did what, towards, motivation and behavior. Focus on communication is less focused on the characteristics and connection aspects of the communication and increasingly focuses on management, action, and issue elements. Guidance as a topic became relevant with the focus on the action, fairness, purpose, confidence, and related behavior. The topic respect is less focused on abilities and behavior, and focuses more on rights, values, needs, action, management, and growth. The focus on support. Trust shows additional focus on personal values without other significant changes. The explicit topics on encouragement, feedback, and work lost in relevance as these are not defined in the topics in 2020-2021. Lastly the focus in the topic of knowledge did not change significantly since both the effect of knowledge and confidence belong together and feelings and behavior are of relevance without significant changes.

Table 11

General focus and importance of the top 7 topics compared between years in answers to leadership that enables employees to work at their best

Topic	Focus generally 2017-2021	% of model	Focus 2017-2020	% of model	Focus 2020-2021	% of model
Clarity	Management (power-distribution), and task requirements	6.1	Task requirements, behavior, and contribution	4.8	Motivation, support, enabling work (giving objectives or requirements), and behavior	6.3
Communication	Management (being able), problems, action, feelings and behavior (humor, courage)	6.2	Characteristics (fairness), behavior and feelings (humility, courage, friendly), connection, and action (advice)	8.4	Management (empower), action (teaching, suggest), issues, empathy, and behavior (humor)	7.0
Encouragement	Action (guidance, advice), reward, and behavior (acknowledging, treatment, patience),	5.7	Management (enabling, empowerment), action (evaluation, advice), growth, and behavior	7.1	*Topic not defined**	
Feedback	Action (listening), behavior and feelings, form (constructive)	5.5	Action (mentor), behavior (honest), growth, and form (e.g. constructive)	6.8	*Topic not defined**	
Guidance	*Topic not defined**		*Topic not defined**		Form (fair), purpose, task (responsibility), action (planning), confidence (ability), and behavior	6.3
Knowledge	Feelings and behavior (respect, passion, humor), and motivation (praise)	6.9	Effect (inspiration), feelings and behavior ((com)passion, kindness), confidence, action	6.1	Confidence (awareness, experience), feelings and behavior (gratitude, attitude), management (independence)	7.0
Respect	*Topic not defined**		Ability (competence), form (acknowledgement), behavior (humility, compassion), and growth	5.5	Rights, values and needs (freedom, time), action (share, independence, management (allow), and growth	6.5
Support	Need, action (advice), motivation (praise), behavior (trustworthiness, humor) empathy, management (assurance), and reward	14.4	Action (guidance, advice), management (structure, stability), feelings and behavior (trustworthiness, enthusiasm), and growth	15.5	Behavior and feelings (approachable, empathy), action (advice, judgement), and motivation and confidence (career)	15.9
Trust	Management (empowerment), action, behavior, driving force (pressure), and motivation	15.3	Action (advice, performance), behavior and feelings (authenticity, humility), management (authorization), and growth	14.1	Action (feedback, speaking), feelings and behavior (enthusiasm), values (candor), and management (enabling, power)	17.8
Work	*Topic not defined**		Motivation (recognition), contribution (appreciate, give), reward, value (ethic), and evaluation	6.9	*Topic not defined**	

* in the models that are created for this study this topic is not explicitly included it might be in a model with fewer or more topics, or topics of its elements are more explicitly defined as topics.

Comparing clusters of topics between years

The topics can be clustered with the 5C's model, but correlation plots (see graphics in supplementary 4.1.3 and 4.2.3), suggest that the approximately 15 to 23 topics for each year in.

both answers do not show only 5 big cluster. The correlations of topics graphs in the topic models show that the higher the number of topics is, the more intercorrelated are the topics, this includes that topics share more words with other topics and thus present the subtopics with small nuances on what these topics focus. As a result, smaller topic models have been chosen to see which main topics are resulting from this analysis in R.

Table 12

Single topics and clusters for answers in 2017-2021

Single topics and Clustering	**Topics on achieving your potential**	**Topics on leadership that enables performance**
2017-2021		
Single topics (not clustered)	Leadership (T1), Management (T3), Challenges (T4), Recognition (T6), Development (T7), Success. (T9), Families (T10), Appreciation (T11), Happiness (T12), Feedback (T14), Results (T15)	Empathic (T2), Communication (T8), Support (T9), Clarity (T11), Trust (T12), Knowledge (T13), Vision (T16)
Cluster 1	New (T8), Learning (T13), Knowledge (T16)	Encouragement (T5), Feedback (T10)
Cluster 2	Growth (T2), Others (T5), Achieving (T17)	Honesty (T1), Freedom (T3), Decision (T4), Leadership (T6 and T), Fairness (T14), Understanding (T15), Person (T17), Work (T18), Inspiration (T19)

Table 12 is based on the correlation plots of the R analysis. It shows four clusters for answers on the open-ended questions next to topics that stand more for themselves. Two cluster under achieving your potential over the years 2017-2021, consist of the words new, learning, and knowledge that represent a form of personal growth, and the words growth, others, and achievements, that represent growth of others through achievements.

The two clusters under leadership that enables employees to perform at their best over the years 2017-2021, consist of the word's encouragement and feedback, in cluster 1, that focus on feedback effect as well as its forms, and a cluster with the word's honesty, freedom, decision,

leadership, fairness, understanding, person, work, inspiration, that represent treatment by the leader. Next to these clusters are several single topics.

Table 13

Single topics and clusters for answers in 2017-2020

Single topics and Clustering	**Topics on achieving your potential**	**Topics on leadership that enables performance**
2017-2020		
Single topics (not clustered)	Achieving (T2), families (T4), Leadership (T3), Happiness (T9), Success (T15), development (T22)	Clarity (T2), Respect (T3), Open (T4), Work (T5), Recognition (T6), Encouragement (T7), Motivation (T8), Knowledge (T9), Understanding (T11), Vision (T12), Support (T13), Communication (T14), Trust (T15)
Cluster 1	Team (T6), Management (T14)	Organization (T1), Be/being (T10)
Cluster 2	Promotion (T12), Recognition (T17)	
Cluster 3	Helping (T7), People (T8), Results (T16), Others (T20), Seeing (T21)	
Cluster 4	Satisfaction (T1), (T3), Knowledge (T5), Challenges (T10), Feeling (T11), New (T13), Learning (T18), Feedback (T19), Problem (T23)	

Table 13 is based as well on the correlation plots of the R analysis. It shows five clusters for answers on the open-ended questions next to topics that stand more for themselves. Four cluster are under achieving your potential over the years 2017-2020. The first cluster includes the words team and management, that represent working with and managing teams. The second cluster includes the words promotion and recognition, that represent a form of motivation and reward. The third cluster includes the words helping, people, results, and others, which represent working and helping others to reach higher results. The fourth cluster includes

Satisfaction, knowledge, challenges, feeling, new, learning, feedback, and problem, that represent a broader

The one cluster under leadership that enables employees to perform at their best over the years 2017-2020, consist of organization and being, that represent what a leader should do and represents in a broad sense.

Table 14

Single topics and clusters for answers in 2020-2021

Single topics and Clustering	**Topics on achieving your potential**	**Topics on leadership that enables performance**
2020-2021		
Single topics (not clustered)	Feedback (T3), Targets (T5), Growth (T9), Learning (T11), Completing (T12), Solving (T13), Life (T16), Time (T18)	Trust (T1), Inspiration (T2), Support (T5), Knowledge (T7), Guidance (T11), Integrity (T13)
Cluster 1	Achieving (T1), Goals (T4)	Clarity (T3), Communication (T10)
Cluster 2	Others (T6), People (T8)	Empathic (T4), Open (T6), Listening (T8), Vision (T9), Respect (T12), Recognition (T14)
Cluster 3	Projects (T7), New (T10), Success (T14), Opportunities (T17), Recognition (T20)	

Table 14 is based as well on the correlation plots of the R analysis. It shows five clusters for answers on the open-ended questions next to topics that stand more for themselves. Three cluster are under achieving your potential over the years 2020-2021. The first cluster includes the words achieving and goal, that represent success with work objectives and own objectives. The second cluster includes the words others and people, that represents a form of motivation and reward. The third cluster includes helping, people, results, and others, which represent working and helping others to reach higher results. The fourth cluster includes Satisfaction, knowledge, challenges, feeling, new, learning, feedback, and problem, that represent a broader Two clusters under leadership that enables employees to perform at their best over the years 2020-2021, consist of organization and being, that represent what a leader should do and represents in a broad sense.

Generally found for all the results on found topics and clusters above, these are all related with each other as they construct the concept of happiness at work under the two domains answered in the open-ended questions. The correlation plots show thereby how these topics are linked with another. The more topics there are the more do these topics also represent subtopics of these single topics and "small" clusters (in case of the chosen topic models). These subtopics then show more correlations as smaller similarities between the main topics are represented as well.

Discussion

Many concepts related to happiness at work (HAW) have been introduced in different studies. Whereas these concepts explain HAW, changes due to developments and events in society result in different experiences and behaviors of people. Observations of these changes led to the assumption that concepts under HAW also change, including that new concepts might arise under HAW. This assumption also raised the question of the actuality of the concepts. Hence, questioning how far the 5C model still adequately represents these concepts change and its implications for the iPPQ since the iPPQ is based on the 5C model. In addition, this research also analyzed the potential of open-ended questions in the iPPQ.

For this purpose, a focus group with experts on HAW, an interview about text mining for measuring HAW with open-ended questions, and an analysis of answers to the two open-ended questions of the iPPQ were conducted. The focus group added insights into the practical experience of guiding employees and organizations on HAW and developments in the theory of HAW over the last ten years. The analysis generated topics from the answers to the open-ended questions and reviewed how far these topics can be clustered under the 5C's. Furthermore, these topics have been explored on how far they changed in relevance and content over time due to developments and events in society. The interview on text mining and the use of open-ended questions for measuring HAW specifically in the iPPQ added to the understanding of the potential and possibilities of measuring HAW with open-ended questions.

Sub questions 1 and 2

What do we learn of the 5C?

What topics fit the 5C model and what can be explained by other concepts?

Based on the theoretical framework, the focus group, and the data analysis of the iPPQ, the 5C model can be understood as a framework that clusters all the in this research encountered concepts and topics that constitute HAW. The framework is presenting a structured overview of these concepts and topics. This clustering under the 5C is one possible perspective on how the concepts and topics under HAW are related and explains the impact of topics in society on HAW.

Concepts and topics found in this research could all be linked to one or more of the 5C. As a result, the perspective of the 5C to cluster all the concepts and topics named in society is a reasonable choice to understand these concepts and topics related to HAW. Nevertheless, the model is rather complex regarding the interrelatedness and influence the concepts and topics have with another and the 5C. As an example, "Feedback," one of the topics found in this research, can be linked to each concept of the 5C. Feedback can be seen as a contribution of oneself or from someone else, as a motivating factor under conviction, as something that is supported by the system under culture, as an element of someone's commitment, and as something that one gives because of confidence or something that raises once own confidence. Therefore, the 5C model offers a wide range of topics that can be understood and linked to HAW but has a rather complex structure to understand or see change in the topics that are related to the concepts.

New topics and topics that do not fit the 5C could not be found in this research. One possible explanation is that most topics that are appearing to be new just have never been

thought about or have been neglected and instead rise in relevance, brought them into focus. Also, it cannot be claimed that all relevant concepts and topics that constitute HAW have already been found. The lack of awareness of such topics is due to limitations in measurement methods that makes discovering of these topics difficult or even impossible (Participant 3, personal communication, March 24, 2021). It has, therefore, to be considered as well. Nevertheless, the concepts and topics regarding HAW found in this research support the assumption that the 5C model covers the relevant concepts and topics. This assumption results from the fact that all relevant topics found in this research, including the theoretical framework and findings of the pre and main study, can be linked and explained with the 5C's.

The complexity of the 5C model has some advantages and disadvantages. The 5C model gives a generalized and logical perspective on how the concepts and topics are linked, resulting in HAW. Consequently, changes in the topics mean that all concepts under the 5C need to be adjusted, impacting the iPPQs validity. This adjustment is complicated due to the complexity of the 5C model since the topics are part of several of the 5C simultaneously.

Sub question 3

Do we see new structures or concepts in answers to the open-ended questions in the crisis?

While HAW is a concept that has been researched for a long-time, changes in the concept make it much more complex to understand and measure. The dynamic nature of the concepts of HAW is confirmed with the findings of this study. Specifically, the topics found from 2017 to the end of 2019 compared with the topics in 2020 show these changes in HAW.

Changes found in the topics in the main study include both changes in relevance (see Tables 8 and 9) and content of the topics (see Tables 10 and 11). Developments in the society can explain the change in the topics and concepts; this might be due to incremental changes overtime or more rapid ones, like crises, such as Covid-19, in which measures changed working circumstances rapidly. These changes found in this research are likely a result of the measures taken for Covid-19. These measures had a considerable impact on work-life in society. Other studies also showed in this regard that changes of circumstances in the society due to events such as a crisis showed permanent or long-time changes in the well-being of individuals, despite the ability adaptation (Fujita & Diener, 2005; Lucas, 2007).

An example of these changes found in this research is the topic feedback. Its focus shifted from who gives feedback, its effect on the recipient, relationships with colleagues, and feedback on tasks, to mainly feedback characteristics (see Tables 10 and 11). Observations from the developments can explain this due to Covid-19. First of all, the people's focus was set on being able to work at all, with the new situation at hand and less on who gives feedback, relationships, or general feedback on tasks. On the other hand, feedback characteristics became more relevant to enable efficient work and ensure that the necessary feedback was given correctly. Thus, the functionality of the feedback became the new focus overshadowing the other elements of feedback. This new work situation included problems and difficulties, such as changes in the workplace, which often included a shift to the home office or new protocols and rules at the workplace. Hence, resulting in the change of content and relevance of the topic.

While the 5C model shows a feasible perspective to understand HAW and the changes in the underlying concepts and topics, the model needs to be seen as one of many possible

perspectives on how the concepts and topics under HAW can be understood. The 5C model and with it the framework of the iPPQ should, therefore, not be seen as "the truth" similar to a physical law seen as the one and only, all explaining perspective with which HAW can be explained (Participant 3 & participant 4, personal communication, March 24, 2021). Furthermore, in the interview was stated that developments and events in society, such as technology, drive change in society, affecting these social concepts and topics (Participant 2, personal communication, March 31, 2021), leading to change of the concepts and new understandings of these.

Because the relation between concepts and topics can be viewed with different perspectives, other perspectives and the 5C model are also relevant to understanding HAW. In the words of Diener et al. (2017), the analysis and understanding of HAW require a multidimensional approach. Therefore, other structures or ways of clustering the topics and concepts of HAW are relevant to understand HAW. As one perspective to understand how the concepts and topics of HAW are interrelated, the 5C model offers a good generalization for the concepts. Nevertheless, the complexity of the model makes it complicated to compare and understand the distinct topics found in this research since these topics often range to more than one of the 5C. This comparison of distinct topics is relevant to improve how HAW is analyzed, including its related problems and advantages (Diener et al., 2017).

As a result, a different approach that focuses on the distinct topics rather than the generalized clusters of the 5C for analyzing the factors that influence an employee's happiness is a possible way to measure and analyze the relevant topics that constitute HAW, adding to a more multidimensional perspective on HAW and enabling to keep change of the topics and related concepts in focus. A common factor of all these perspectives, models and concepts, including the 5C's, is the centrality of managing the worker's experiences and organizational goals and needs (Weiss & Rupp, 2011). Due to the multidimensional and dynamic nature of the concept of HAW, the appearance of new structures is typical (Participant 2, personal communication, March 31, 2021). In this regard, the findings of this research show distinct topics rather than clusters of those. But these findings are limited by the number of topics that were analyzed. A separate statistical analysis of the dataset showed that new structures could be found. These are mainly clustered around specific themes (Participant 3, personal communication, March 24, 2021).

Sub question 4

What is the usefulness and potential of open-ended questions for measuring HAW?

As discussed above, the answers to the open-ended questions fit the concepts and topics related to the 5C on which the iPPQ is built, implying that the open-ended questions can gather the information needed to measure the topics related to the 5C to determine HAW. Consequently, the open-ended question offers a possibility to replace the scaled questions currently used in the iPPQ. Therefore, it is of interest what the added value or possible disadvantages of the open-ended questions are.

Fundamentally the use of questionnaires has its disadvantages, and the finding of this study shows that open-ended questions can at least partly improve and fix these. A fundamental challenge for measuring social concepts such as HAW is a tension between generalization and

contextualization (Participant 3 & participant 4, personal communication, March 24, 2021). For example, for experts advising individuals or organizations on HAW or actions in the work process that influence HAW, contextualization can become more relevant than generalization. This need for contextualization arises since each case is prone to different situations and needs, therefore a more in-depth understanding of the relevant circumstances for each case. The use of open-ended questions offers a solution for this problem since the answers to open-ended questions are text data; these can offer more in-depth information, including elements for contextualization (Friborg & Rosenvinge, 2013).

Furthermore, the concepts measured are often vague or ambiguous and mostly very large, making it difficult to measure the entire width of the concepts, such as the 5C (Participant 2, personal communication, March 31, 2021). The freedom that open-ended questions offer is that people can express who they "truly" are (Participant 2, personal communication, March 31, 2021). Such as expressing personal issues and situations that are the most relevant for them (Participant 2, personal communication, March 31, 2021), making it possible for them to answer the niche of the concepts of HAW that are the most relevant for them. On the one hand, this freedom allows for a better and more specific view of the individual's experiences and needs, and it allows the questionnaire to be not limited to a small part of the entire concept. In addition to making measuring a wider range of the concepts possible, open-ended questions also bring the practical advantage that one open-ended question can cover several scaled questions at once. Thus, open-ended questions can significantly decrease the size of the questionnaire and allow for the addition of new questions (Participant 2, personal communication, March 31, 2021).

The usefulness of the depths of the answers is thereby that an expert can manually read the text answers and use them when advising individuals to get a better understanding of the person and their situation. Next to the scores that give a general idea of how happy people are and areas that need to be advised to raise HAW, which is gained from scaled questions, open-ended questions add more in-depth information (Participant 2, personal communication, March 31, 2021). This information includes feelings, experiences, or wishes that a person expresses him or herself about a topic in addition to scores that give a general understanding of the person's happiness. Therefore, open-ended questions bring the researcher or analyst closer to the employee than scaled questions (Participant 2, personal communication, March 31, 2021). The more in-depth understanding of an individual's or an organization's situation that can be acquired from open-ended questions is further emphasized by the statement that well-being at work focuses on the centrality of the worker by Weiss and Rupp (2011). Thus, to best measure HAW and advise individuals and organizations, this depth of answers is a valuable resource that open-ended questions can offer.

In addition, a practical advantage is that the data that answers to open-ended questions bring are a "gift" for new research to better understand HAW (Participant 4, personal communication, March 24, 2021). Over time, these answers will gather much input for future research. The added value is that this data can also be used to test if the current questions and evaluations of the iPPQ are still valid or have changed due to societal developments and events.

While in this study, an unsupervised method was used, whereby the dataset was analyzed more manually, programming with R also offers ways of supervised machine learning. With supervised machine learning, the analysis is more automated and enables the efficient

analysis and evaluation of answers to open-ended questions to create scores based on word combinations and cooccurrences (Participant 2, personal communication, March 31, 2021). While text data such as the open-ended questions in the iPPQ are more complex than numerical values of scaled questions, computers can systematically analyze and process text data, creating valuable outputs for interpretation and evaluation. Especially this systematic method in which a computer analysis has its advantages since the computer works strictly with the meaning and logical connection between words, decreasing biases (Participant 2, personal communication, March 31, 2021) in contrast to interpretations of a researcher.

Technological developments and growth of understanding in text and data analysis with text mining methods show the potential that open-ended questions have for measuring HAW. Furthermore, these technologies and methods are in constant development, which shows that text mining has excellent potential to develop further in the future. This ongoing development raises the questions for how long, scaled questions will be superior for measuring social constructs and in how far these open-ended questions offer not already better results (Participant 2, personal communication, March 31, 2021).

Whereas open-ended questions present many advantages, as discussed above, they also hold some elements that need further consideration. For example, computers do not understand human language or cultural differences (Participant 2, personal communication, March 31, 2021). Therefore, they are limited to what definitions and information are in the computer's script to do text mining (Participant 2, personal communication, March 31, 2021). Another limiting factor of open-ended questions is the required quality of the dataset. In cases where words or sentences are not distinguishable by the computer, it is impossible to evaluate them. Based on experience from the text analysis in this study, this problem is rather significant since even answers that include only a few words are often prone to many spelling mistakes. A single word can be misspelled in a large variety of ways. This challenge means effective use of open-ended questions, and analysis of those with text mining methods requires assurance of the quality of the answers. A possible way to increase and ensure the quality of the resulting dataset is autocorrection of words when people fill out the questionnaire.

Research question

How do the open-ended questions in the iPPQ confirm or extend the 5C model on HAW?

This research shows that the topics generated from answers to the open-ended questions in the iPPQ can all be linked to the 5C model, confirming that open-ended questions can measure the same concepts and related topics as the scaled questions in the iPPQ. The topics found from the answers do not entirely present the same topics that are asked with the scaled questions in the iPPQ. Consequently, the open-ended questions in the iPPQ extend the width measured from the concepts of the 5C. This added wider range and depth include the possibility of gaining insight into the employees' currently relevant topics and their true feelings and experiences.

In addition, the findings of this research show that the topics and concepts of HAW are dynamic and change over time due to developments or events in society. An advantage of open-ended questions in this regard towards scaled questions is that open-ended questions do not limit the answers to the score of a specific question that might be outdated but offer an understanding of the shift of relevance and content. Thus, extending the usefulness of answers even when questions are not anymore that relevant.

Conclusion

Happiness at work is a complex concept that includes many concepts and topics relevant to employees' positive experiences at work. These give them the necessary driving force to achieve their potential and perform their best at work. In regard to inquire about the employees' level of happiness, the iPPQ questionnaire is a tool that measures HAW based on the 5C model. Since this 5C model generally includes all the topics and concepts found in this research, it indicates a suitable clustering method for understanding how these topics affect HAW. Nevertheless, other perspectives add to the understanding of HAW, making it relevant to see what other structures reveal for a multidimensional view on HAW. A different perspective would be to view HAW by the underlying topics instead. These cover several concepts and cannot generally be clustered under single concepts such as a single concept of 5C.

Changes in the topics and concepts in times of a crisis such as Covid-19 reveal and reaffirm the dynamic nature of HAW found in previous studies on HAW. This change is found in relevance and content of the topics. As a result, the actuality and evaluation of the questions in the iPPQ need to be adjusted to determine a person's degree of happiness validly.

Lastly, the use of open-ended questions in the iPPQ shows potential for replacing scaled questions to gain more in-depth answers from employees about topics relevant to them concerning HAW. Therefore, open-ended questions have the potential to decrease the size of the questionnaire and offer space for new questions as well.

Implication for Theory on HAW

Several concepts and topics can be found under HAW. To best understand these concepts and topics and how they are interrelated with another and with HAW a multidimensional approach is required. The 5C model that has been in focus in this Thesis shows that it is suitable to cluster all the concepts and topics of HAW that have been encountered in this research. Nevertheless, this perspective on HAW shows also its limitations. Therefore, others perspectives are required in addition.

The dynamic nature of HAW showed that topics and concepts change over time due to developments or events in society. As a result, the concepts and related topics of HAW need regularly new evaluations on what their focus and relevance for society is to accurately determine and understand their impact on HAW.

One possible perspective that could supplement the 5C model, is to take a look at the topics that are of importance for people, such as the topics found in this research. This allows to better keep an overview on what is relevant in society and allows for easier observations and adjustments of change in those. This is advantageous because these topics are linked to several of the concepts of HAW and thus apply to several of the 5C at the same time which makes it difficult to distinctly observe or measure the change of these topics and evaluate their effect on HAW.

For measuring HAW with the iPPQ this means that the questions in the iPPQ need to be actualized and topics that rose in relevance should be considered to be added if these are not included in the questionnaire yet. It further means that to best measure HAW and to keep the questionnaire up to date, the questions need to be checked and adjusted periodically. The current model of the 5C that is used is thereby complicated to update since the concepts change

due to the shift in the relevance and content of the topics, which effect the concepts at large. Therefore, it should be considered to use maybe another perspective to determine the questions and to use the chosen models such as the 5C to evaluate and analyze the findings to these questions rather than to use the 5C model as the structure of the questionnaire itself for simpler management of the questions in the iPPQ.

Implications for using open-ended questions for measuring concepts of HAW

Developments in technologies and methods in the field of text-mining allow for a different approach on how to measure social concepts such as HAW. In place of many scaled questions that answer a certain concept, answers from open-ended questions can cover input for these different concepts at once. This offers the possibility to slim down the questionnaire by using open-ended questions. Furthermore, the deeper and contextual content of these answers widens the range of topics and concepts that are measured removing the limitation of specifically formulated scaled questions. Since the technology and methods with programs like R are in constant development the methods to analyze answers to open-ended questions are improving as well. This offers a future with high qualitative analysis of text data. In addition to its partiality the text data adds possibilities for exploratory research which helps to keep the questions and evaluation algorithms actual. Since these algorithms need to be updated regularly because of changes over time.

For the iPPQ this means that open-ended questions are a feasible choice to restructure or add new questions to the iPPQ. The size of the iPPQ can be effectively slimed down with open-ended questions since the answers showed that they measure the related topics to the different concepts under the 5C while giving the possibility to even extend the scope of the questions to topics and concepts that are not explicitly measured by the questionnaire due to the amount of questions that are needed for it.

Limitations

In the context of the research questions of this paper, a pre-study and main study have been conducted. In both, limitations of the study have been encountered. The focus group on the trends in HAW required participants to discuss questions that the researcher has moderated. These questions have been kept general, and participants were invited to discuss the topic freely. One drawback was that the last question specific to the period of Covid-19 was relatively short, giving only a little information about it as time was a limiting factor to discuss that question for a longer time. Another limitation in the pre-study was the transcription process of the focus group. The use of the platform "Amberscript" for the focus group discussion's automated transcription went well. However, several sentences and words were difficult to understand and transcribe, even with manual transcription.

In the main study, several limiting factors have been related to the data analysis with R. The original dataset with more than 60.000 responses that was supposed to be used for this study had low quality and could not be used. Therefore, only the latest part of the dataset could be used, ranging from 2017 to 2021. This smaller dataset included around 8000 responses, thus having a significantly lower number of responses, and included only data on the last four years

from when this study took place. Problems that lowered the quality were specifically that the answers on the open-ended questions showed several limitations in the form of doubled and incomplete words and sentences that must have resulted from the process when the dataset was assembled (before the researcher had received the dataset). Another limiting factor was the scope of the R analysis since only a few of all the available methods could be done within the limited timeframe.

A limitation for the answers resulting from the R analysis was transforming the multidimensional word matrix to single topics. Fitting up to 1093 and 899 different words (see Table 4) in 14 to 23 topics could not be done without residuals that did not fit these topics. Thus, although the topics could include the majority of the matrix words, several words were either not recognized by the program and linked to other words or just didn't fit with the number of chosen topics. To select a number of topics, several diagnostic values, such as the held-out likelihood, semantic coherence, exclusivity, and correlations of topics, were considered. A different number of topics lead thereby to slightly different topics. Thus, the choice of the number of topics had a significant influence on the output.

Furthermore, the choice of packages used in the R script also influenced the methods used to analyze the dataset. Especially the selection of the package for the transformation process in R also led to different resulting topics. The package STM was chosen in this research because it builds on the commonly used methods like LDA and added helpful functions such as the diagnostic evaluations for the number of topics to more accurately decide on the number of topics. Never the less another package might have resulted in partly or entirely different topics.

For the work on the thesis, the most limiting factor was the measures in times for Covid-19 since this only permitted meetings and work online with the supervisors, interviewee, and participants of the focus group. The technology of MS Teams worked well for this purpose, but limiting factors of the technology were the internet quality and direct interactions with the other persons. Thus, observation of participants during the focus group was difficult due to the person's camera positioning or bad lighting.

Additional Directions for Future Research

In addition to the analysis of the dataset of the iPPQ done in this study, the number of topics could be increased to analyze clusters of topics better and determine more precisely which nuances each cluster holds. Additional research could also explore the dataset on the sentiment of the answers to see which emotions the open-ended questions capture and how these can be used for evaluations and guidance of an employee’s happiness.

Generally, the theoretical implication of HAW being a dynamic concept raised the need to regularly actualize the relevance and content of the concepts and topics related to HAW. This need to actualize the theories on HAW leads back to the core question of the research of HAW what makes people happy at work. Since content and relevance of topics changed, periodical research on these topics and research after events such as the Covid-19 crisis is relevant to be able to adjust to these and have an up-to-date view on what HAW relates to in society.

Lastly, the potential of open-ended questions is a given. Therefore, future research should also include the actual efficiency of using scaled questions vs. open-ended questions with the current possibilities of text mining.

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Appendix

Appendix A iPPQ items in the dataset of the iPPQ version from 2017 to 2021

1	What is your gender?
2	What is your age group?
3	What is your nationality?
4	In which country do you live?
5	In which country do you work?
6	What best describes you?
7	Which best describes your department within your organization?
8	What is your organization's name? (NA if not applicable)
9	How many people are part of your organization?
10	Where are you in the hierarchy of your organization?
11	How many people do you manage directly?
12	How many people do you manage indirectly?
13	What is your work sector?
14	Do you work: Part time or Full Time?
15	How many hours a week do you work on average?
16	How many days of sick-leave did you take last year?
17	When did you join your current organization?
18	How many months do you see yourself staying in your current organization? (max 120 months)
19	In general, you consider yourself to be...
20	Compared to most other people you know; would you say that you are...
21	Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?
22	Some people are not as happy as they might be. Although they are not depressed, they might be happier. To what extent does this characterization describe you?
23	What are three main things that make you feel like you are achieving your potential?
24	What are three main things you look for in a leader to enable you to perform at your best?
25	Do you appreciate the values that your organization stands for?
26	How insecure do you feel in your current job?
27	How much do you love your job?
28	Can you raise issues that are important to you?
29	Are your views ignored?
30	How much do your colleagues respect you?
31	How much does your boss respect you?
32	How effective do you think you are at your job?
33	Do you lack interest in your work?
34	How motivated do you feel while at work?
35	How much do you feel your work has a positive impact on the world?

36 How much do you like your colleagues?
37 How much do you feel you are living up to your potential?
38 How much do you wish to leave your current job?
39 Do you agree that you often feel a strong burst of positive emotion at work?
40 Do you trust the vision of your organization's leaders?
41 Do you agree that your stakeholders give you positive feedback?
42 How much in control do you feel over your day-to-day activities?
43 How fair is the culture at work?
44 How efficiently are you able to get things done at work?
45 How well does your job fit with your initial expectations of it?
46 Are you resilient when it comes to coping with difficult times?
47 How much do you love your work?
48 Do you feel you are doing something worthwhile?
49 Do you have a sense of getting things done at work?
50 Would you recommend working at your organization to a friend?
51 How proud are you of your organization?
52 How much do you trust your organization?
53 How satisfied are you with your life?
54 Do you make use of your skills at work?
55 Do you like your physical work environment?
56 How satisfied are you with your job?
57 Do you dislike having challenges at work?
58 Do you make use of your strengths at work?
59 Does your current job fit well with your career plan?
60 To what extent do you feel you are being paid fairly for the work you do?
61 To what extent do you feel pay raises in your organization are tied to performance?
62 How confident are you that you will receive a pay raise within the next 12 months?
63 Does your work provide sufficient opportunities for learning?
64 How much do you go out of your way to help your colleagues?
65 Do your achievements at work tend to be recognized?
66 Do you have problems achieving your work goals?
67 Are you successful in most parts of your chosen career?
68 Are you confident that you perform effectively on many different work tasks?
69 Do you have difficulty overcoming challenges at work?
70 Generally, do you do things better than other people?
71 What % of the time do you feel energized at work?
72 What % of the time do you feel engaged at work?
73 What % of the time do you feel happy at work?
74 When thinking about the things you do at work, what % of them do you love?
75 What % of the time do you feel productive / on task at work?

Appendix B Description of the analysis with R

One core element of text analysis is how words co-occur within texts (Gefen, Endicott, Miller, Fresneda, & Larsen, 2017). This co-occurrence of words is then further used to generate topics that can the categorized for a better understanding of the content of the text. To perform such an analysis in R, several algorithms are necessary that R has available in packages. These packages enable functions that can be used to perform tasks in R.

For this text analysis on the dataset from the iPPQ several steps have been taken. First, the dataset has been uploaded as a CSV file which required the package "readr". To further process the dataset, several other packages were required as well. The preparation of the dataset was done in two iterative steps. At the core of the data preparation were the packages "tidyverse" and "tidytext". Especially the package "tidyverse" was of use throughout the whole script, as the pipe-operator function of "tidyverse" supports chaining functions and running them together, which was also of use in later steps.

The first part of the data preparation included filtering and cleaning the dataset. It included filtering for the language of the data, and the later analysis, also filtering on the date to divide the dataset by years. On the other hand, with the use of the mutate function of the "tidyverse" package, words from the dataset have been corrected on spelling, similarly spelled words have been changed into variables if needed to preserve them for later analysis (further explained after the next part), and stop-words have been defined.

In the second part of the dataset preparation, the data was tokenized with the help of the "tm" package (sentences and word clouds were separated into single words). All words were changed to lower case, numbers, punctuations, symbols, and stop-words were removed from the dataset, and the remaining words were stemmed (reduced to the word stem). To complete the stemming, a second step had been added, the stem-completion. The "tm" package was required to create a vector and corpus from the original dataset for stem completion. The stem completion is based on the corpus from the original data. This corpus was used as the basis from which the most frequent endings of the words were selected to complete the stemmed words. After the stem completion, the words changed into variables were changed back into the specific words.

The creation of variables and the change back to words after the stem completion was required to maintain the sense of the words that had similar stemming but different meanings. With this process of stemming, these words would have been all reduced to the same stem otherwise. This data preparation was an iterative process in which the outcome was reviewed, and changes were applied to the script. Additionally, to the "tidyverse" and "tm" packages, the "Janitor" package was needed to remove empty columns to finalize the preparation of the dataset.

The analysis of the dataset with R included two parts as well. First, the word frequency was visualized. Second, topic models were created. The word frequency was calculated with the help of the package "janitor". A document term matrix (dtm) was created to visualize the word frequency and the further creation of topic models. The package "ggplot2" was used to create a bar graph with the top 20 terms.

For the further processing of the dataset, the dtm was changed to a sparse matrix. The reason is that a sparse matrix in programming languages uses a particular data structure that

efficiently stores sparse data (cmdline, 2019), thus more efficiently than the previous dtm. Sparse data refers thereby to datasets that have only a few non-zero elements (cmdline., 2019), which is the case for the word document matrix generated from the dataset, as the single words are listed with regard to the co-occurrence with other words in the matrix.

For the topic models, a decision between three different packages to create topic models has been made. These packages are "LSA", "LDA", and "stm". Generally, LSA and LDA are two fundamental methods for generating topic models.

LSA stands for Latent Semantic Analysis; it decomposes a data matrix into a separate document-topic matrix and a topic-term matrix (Gandhi, 2021). Latent topics are thereby found with the help of dimensionality reduction, as generally, the data matrix consists of several dimensions that include only a few non-zero values (Gandhi, 2021). This is done with singular value decomposition (SVD).

LDA stands for Latent Dirichlet Allocation and is based on PLSA, which in contrast to LSA, does not use SVD but uses a probabilistic model with latent topics (Gandhi, 2021). PLSA bases itself on how likely it is to find given topics (Gandhi, 2021). LDA thereby generates a better generalization of word topic distributions than PLSA (Gandhi, 2021).

The package "stm" is based on LDA and features several functions that make topic modeling and data preparation simpler. Two reasons led to the choice for "stm". First, a practical reason for text analysis with "stm" exists easily accessible and comprehensive online guides, with examples, including many questions and answers, that made it easier for me to get used to the method. Second, "stm" seemed to be more suitable because it builds on the LDA package and other probabilistic topic models (indicating that it is a more develop and more recent method that thus also functions more efficiently with all types of texts). stm thereby permits the inclusion of arbitrary metadata and has been successfully used for several types of text analysis, such as on newspaper articles, open-ended survey responses, and tweets in Twitter, to name some (Roberts, Steward, & Tingley, 2019). This method also gives possibilities for further analysis in the direction of hypothesis testing and analysis of relationships to document metadata (Roberts, Steward, & Tingley, 2019), which have been not the focus of this study yet but might have been feasible options for further analysis in this study. Based on these considerations, I chose to use "stm" for generating topic models.

Before creating the final topic model, a random number generator was used before using "stm", which enabled parallel processing to generate several estimations in a single process (Vaughan & Dancho, 2021). The multiprocessing was done to compare different topic models with each other to find the most suitable number of topic models that best represent the purpose and the dataset. This was done with the package "furrr", a reproducible random number generator, and its function "plan(multiprocess)", to be able to consistently generate the same topics with regard to the value K in "stm" (Vaughan & Dancho, 2021).

Before the final topics were created, for further manual analysis, the number K of the most suitable number of topics that best represent the dataset has been analyzed. For this purpose, the diagnostic values offered by "stm" were used. The value K that has been determined for the different settings was then used to create the topic models.

From the topic models that have been calculated, a correlation plot has been made using the "igraph" package and its "plot" function. The package "igraph" is made for network analysis and can also be used for correlation analysis (igraph, 2021).

In the last step, R Markdown was used to create a table for the topic models. For this table the package "kableExtra" and its "kable" function were used, for the table to add a caption and names for the table.

Appendix C Content of the supplementary document

The supplementary document to this thesis, includes supplementary text, tables, and graphs on which the findings of this thesis are based. It can be requested at the University of Twente. Included in the supplementary are the transcripts of the focus group and the interview of the pre-study, the R scripts that have been used to generate the findings that have been discussed, the output of the R analysis, and the extended tables on the interpretation of the results of the output from R.