

“Technology isn’t always the best”:

The Intersection of Health Tracking Technologies and Information Practices of Digital Natives

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Abstract— Some believe that today’s young and tech-savvy generation will eagerly adopt the latest health tracking technologies. However, we know little about the tracking practices of young adults, and in particular how they use technologies to journal their daily fitness activities and diet. Drawing from practice theory, this study uses Savolainen’s concept of information practice to examine the life contexts of users (e.g., personal goals and habits) that influence the use of health tracking technologies. Through interviews with thirteen college students, we identify the information practices that young adults perform to track their health and diet, outlining how different information practices exhibit different levels of reliance on technology. Life contexts may help explain why our young adults preferred “traditional” technologies like paper for some information practices. Further we suggest that the design of future health-tracking technologies need to holistically consider the interwoven nature of information practices, life contexts, and tracking technologies.

Keywords— *Information Practice; Health Tracking Technologies; Qualitative Study*

I. INTRODUCTION

With promises to empower health-aware activities, health tracking technologies have gained traction as an integral part of many users’ daily lives. A report published by Soreon Research in 2014 [1] expects the market for wearable healthcare devices to grow 65%, totaling over \$40 billion in sales by 2020. Health tracking technologies are slated to benefit a wide range of populations. In particular, there are predictions that Digital Natives [1, 2]—a generation that has never lived in a world without digital technologies—will bring a major shift in the adoption and development of mobile health technologies due to their natural skill with smart devices and acceptance of ubiquitous computing [3, 4].

Yet, there is evidence that digital natives are not necessarily the eager adopters of health tracking technologies indicated in previous work. Recent research by Web analytics firm Flurry [5] shows that despite the innovative functionality provided by health and fitness apps, users between the ages of 18 to 24 were in the minority among those who use such technologies to track their daily fitness and diet. As of this writing, there has been little research examining why this group of users are not avid adopters of tracking technologies. To address this gap, we argue for the need to understand how health-tracking technologies currently fit into the everyday practices of young adults.

Past research on the utility of health tracking technologies have focused on users who adopted these new devices over a period of time [6, 7, 8]. We build upon this important work and examine the information practices of users who, on their own volition, have chosen to make such technologies a part of their everyday health and fitness practices. Grönvall and Verdezoto [9] have stressed the need for “practice” as a unit of analysis in researching how people bring healthcare technology into their daily lives. Examining users’ actual interactions with technologies for tracking activities or food intake in their naturalistic settings serves as an important first step in understanding how and why young people actually use and do not use health tracking technologies.

This study explores three research questions revolving around the what, how, and why of the roles played by health tracking technologies in young adults’ information practices:

- (1) What type of information practices do young adults perform to track their fitness activities and diet?
- (2) How do technologies support these practices?
- (3) Why do young adults use particular technologies for certain practices when tracking their fitness and diet?

To address these questions, we draw on practice theory—specifically, Savolainen’s [10] framework of everyday information practices. This framework is useful to investigate not only how users deal with information but also how particular life contexts and technologies are interwoven in their dealings with information. Expanding on Savolainen’s notion of “contextual factors”, we define *life contexts* as deeply personal factors that influence the processing or implementing of information practices (e.g., goals behind health tracking and personal routines). We employ this theoretical lens into everyday information practices to guide our analysis of empirical data to unearth specific information practices and life contexts shaping fitness and food journaling.

In this paper, we present a qualitative study to understand the health tracking information practices of young adults. To examine participants’ real life practices, we recruited individuals who—for at least one month—used a technology to support their fitness or food tracking needs [5]. Semi-structured interviews were conducted with thirteen college students who currently use, or have ever used technologies for logging their exercise records or food intake. Photographs of participants’ logs were also taken.

We will first discuss related work in health-tracking technologies. This will be followed by a discussion of information practice as the primary theoretical framework and our field study, a qualitative study of 18-23 year old users of health-tracking devices. We first describe the findings: the type of information practices that the participants enact to track their health. We then explain how technology is integrated into each of these types of information practices. Next, we discuss why there is a stronger relationship between the use of certain technologies and information practices. We conclude by discussing the disconnect between the scope of information practices that health-tracking technologies are designed to support and the actual uses by our young adults (the digital natives users).

II. RESEARCH IN HEALTH-TRACKING TECHNOLOGIES

Self-tracking activities that encourage healthy well-being have become an integral part of today's technological landscape. Technologies that automatically log and motivate activities promise to support users with self-tracking without encumbrance [11]. Research on the topic of health and well-being has been constantly growing in academia, especially in areas such as personal informatics [12, 13], human computer interaction (HCI) [14, 15], healthcare informatics [16] and sustainable design studies [9]. These studies have provided insight into the usability of these devices; for example, how the goal-setting and sharing functions in health tracking technologies improve physical activities [14, 17]. Yet, by focusing on usability, these studies often take an acontextual approach, glossing over the user's own personal contexts, and potentially missing important contextual factors that may influence the use of new technologies for health-tracking. For example, a number of studies have evaluated particular devices or applications by recruiting participants who have never used such technologies before in their personal lives [18, 19, 20, 21].

Nonetheless, recent studies have begun to approach the study of activity tracking devices (in general) in more naturalistic settings. For example, Fritz, et al. [14] looked at a users' life contexts, such as the initial motivation to adopt activity tracking technologies. By ruling out participants who stopped using the technology along the way, their research focused on the advantages of activity tracking devices for long-term users. Rooksby et al. [21] interviewed a variety of users of activity trackers—people who not only had previously used such devices but were also willing to continue using them. The authors coined the term “lived informatics” to underline the importance of considering the daily life context of users within which information practices unfold. Consolvo et al. [13] conducted field trial studies to explore “how persuasive technologies fit into everyday experiences” (p. 1801). Bentley et al. [22] built a system to collect a variety of wellbeing data and asked participants to use their system every day for 90 days. Their findings similarly stressed that life contexts such as one's wellness goals are needed to be understood to accurately reflect one's self-reported logging and tracking. This new body of work on activity-tracking devices suggests that a user's life contexts and their everyday practices need to be further studied.

Nevertheless, within the health and fitness domains [5, 23], specifically when tracking health and diet with technology, there has been little research elucidating what people are actually doing to track their activities, and how they conceive and manipulate such information. Without considering users' practices and their contextual factors, those practices are likely to be oversimplified as usability issues. In addition, most of these studies do not necessarily focus on young adults and do not examine the initial motivation of users when they choose technologies for monitoring/improving their health.

III. METHODOLOGY

We address the gap identified in the literature by drawing upon practice theory, which serves as the theoretical foundation of our analysis of this study's qualitative data.

A. Theoretical Lens: Practice Theory

There is no single, definitive account of practice theory (practice theory at times incorporates work from diverse scholars such as Foucault, Bourdieu, and Giddens [24]). However, Feldman and Orlikowski [25] note a general agreement among the various perspectives of practice theory that: “(1) situated actions are consequential in the production of social life, (2) dualisms are rejected as a way of theorizing, and (3) relations are mutually constitutive. These principles cannot be taken singly, but implicate one another” (p.1241). All practice theorists establish that everyday life and its meaning is manifested in our specific activities and practices.

Practice theory has found application in many domains: consumption studies [26], environmental studies [26], HCI design studies [27], information behavior [28, 29], serious leisure/hobby [30, 31], domestic work [32], craftsmanship and repair [33], personal photography [34], and work context [35]. Yet, practice theory has found relatively little application within the domain of health-tracking technologies. Fitzpatrick and Ellingsen [36], after reviewing 25 years of CSCW research ask for theoretical frameworks that can articulate our practices with healthcare technologies. Most studies of health tracking technologies, particularly in HCI, concentrate on evaluating such technologies by their usability, which may fail to consider a user's life contexts.

Our work follows recent calls to use practice-based approaches as a methodological framework [37] in researching how people bring healthcare [9] and self-monitoring technologies [32] into their daily lives. In this paper, we specifically draw from the concept of “information practice” described by Savolainen [10] which combines practice theories and social phenomenology to conceptualize information practice in one's everyday contexts. Information practice is “a set of socially and culturally established ways to identify, seek, use, and share the information available in various sources” ([10], p.2). By examining information practices, we can parse out how people deal with information—the “practices of information seeking, retrieval, filtering, and synthesis” ([10], p.2). More specifically, this work employs the perspective of everyday information practice to examine the practices of journaling for fitness or diet. Information practice informed both the design of our empirical study and data analysis.

B. Empirical Study

1) Participants and Recruitment

Participants were recruited through flyers on the bulletin boards at a major public university campus in the Southeast United States. A total of 13 participants (10 females and 3 males) participated in this study, ranging in age from 18 to 23 years old ($M=19.7$ years). To track running and diet practices, five participants used mobile technologies such as mobile applications, physical activity tracking devices, laptops, and smartphones. All of them used some mobile applications to track their running activity, and two occasionally used wearable devices such as a Fitbit or Jawbone Up. Three participants had used technologies for the purpose of logging fitness and diet for at least a month in the past but discontinued the use for at least one year before the study. Instead, they used calendars, notebook, or papers (though they continued to use smartphones for music, TV, texting, and social media).

Table 1 displays participant demographics and key information. To be included in this study, the participants had to meet the following criteria: enrolled student of the university, at least 18 years of age, and currently using or have used technology for logging exercise records or food intake. Technology was defined broadly to include notebooks (paper), mobile applications, and physical activity tracking devices.

We required all participants to have a minimum of a month usage with technologies for logging to ensure they had enough experiences using technology for the purpose of tracking fitness or food intake. We asked all participants to provide their past and, if applicable, current logging records from their tracking technologies. These records helped participants recall more accurately their experiences of using digital devices for logging during interviews.

2) Data Collection & Analysis

In-depth, face-to-face semi-structured interviews [38] lasting 50-70 minutes were conducted with the participants. Our interview protocol involved four themes about users' information practices and their real-life contexts: (1) Technology adoption behaviors (e.g., How and why did you start using a certain technology for logging fitness or diet?), (2) Information representation (e.g., Describe your process of logging information), (3) Technology affordances and constraints (e.g., If the technology has a sharing function, would you be willing to share your data on social media?), (4) Reflection from data (e.g., How do you feel while tracking data, or how do you take advantage of your personal data?).

All interviews were audio recorded and transcribed. These questions were tested and refined through a pilot study we had

TABLE I. STUDY PARTICIPANTS' DEMOGRAPHIC INFORMATION AND THEIR TECHNOLOGIES FOR TRACKING FITNESS OR DIET

ID	Age	Sex	Technologies used in the past for tracking fitness and diet	Technologies currently used for tracking fitness and diet	Activities participant logs	Diet data participant logs
P1	19	M	• Notebooks (paper)	• Notebooks (paper)	○ Strength training ○ Running	N/A
P2	23	F	• Mobile phone & apps • Excel worksheet • Wearable devices	• Mobile phone & apps, • laptop (spreadsheet)	○ Running, ○ Yoga	List of food intake
P3	19	F	• Notebooks (paper) • Mobile phone & apps	• Notebooks (paper) • Mobile phone & apps	○ Strength training ○ Running ○ Pilates	N/A
P4	21	M	• Notebooks (paper)	• Notebooks (paper)	○ Strength training	N/A
P5	19	F	• Notebooks (paper), • Mobile phone & apps	• Notebooks (paper)	○ Strength training ○ Running	N/A
P6	18	F	• Notebooks (paper), • Mobile phone & apps	• Mobile phone & apps	○ Strength training ○ Running, ○ Yoga	List of food intake
P7	20	F	• Wearable device (Jawbone up) • Mobile phone & apps	• Mobile phone & apps	○ Strength training ○ Running	N/A
P8	20	F	• Mobile phone (including mobile apps)	• Mobile phone & apps	○ Strength training ○ Running	List of food intake
P9	19	F	• Wearable device (Fitbit) • Mobile phone & apps	• Wearable device (Fitbit) • Mobile phone & apps	○ Running ○ Yoga ○ Cycling	List of food intake
P10	20	F	• Wearable device (Fitbit) • Mobile phone & apps	• Mobile phone & apps	○ Strength training ○ Running	N/A
P11	18	F	• Notebooks (paper), • Mobile phone & apps	• Mobile phone & apps	○ Running ○ Cycling	N/A
P12	21	M	• Notebooks (paper), • Wearable device (Fitbit) • In your head	• Notebooks (paper)	○ Strength training ○ Running	N/A
P13	19	F	• Wearable device (Fitbit) • Mobile phone & apps • In your head	• Wearable device (Fitbit) • Mobile phone & apps • In your head	○ Running ○ Cycling	N/A

conducted with four individuals randomly selected from a university gym. Preceding each interview, participants filled a short questionnaire to provide demographic information and their tracking technology use history. They signed an informed consent form per the university's ethics board review regulations.

Fig 1. Screenshots of participants' diet and fitness logs from their mobile applications

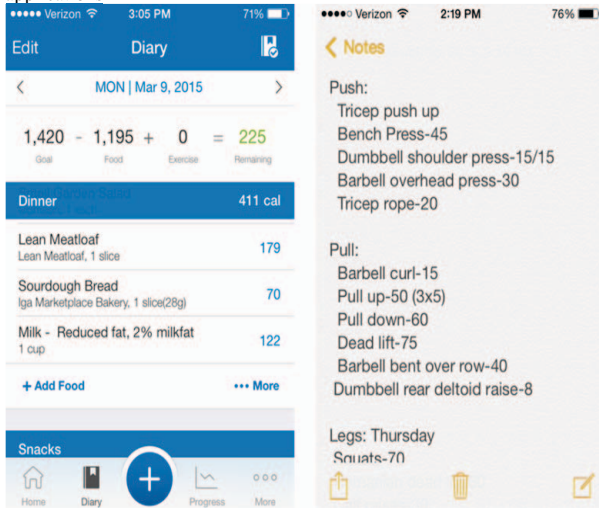
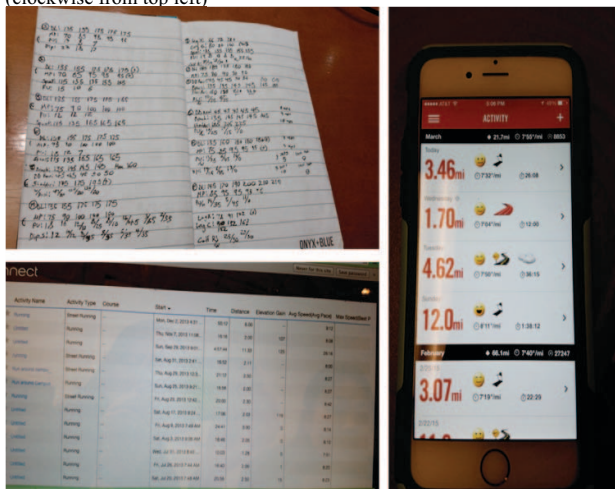


Fig 2. Photographs taken of participants' notebook logs, data recorded by mobile application, and data recorded by physical-activity tracking devices (clockwise from top left)



Photographs were also taken of participants' notebook logs and of the data recorded by their mobile applications and physical-activity tracking devices. This data complemented the interview data by revealing the detailed context of a participant's experiences—for example, the various technologies and their appropriation for journaling fitness and food. Participants were asked to share their data by capturing and sharing screenshots or pictures (Figure 1 and 2) during interviews. A total of 28 photographs were collected from participants. Those images provided contextual information on participants' logging activities in their daily life [39]. The use of these images during interviews also helped elicit memories

regarding specific situations and feelings from participants [40]. Research on health diet mobile applications have pointed out the useful role of photographs, for example, when studying what people eat in everyday life [e.g., 41].

We employed coding and memoing on our qualitative dataset to create an account of themes relative to information practices [42]. Through open coding, concepts and categories that emerged recurrently were identified and discussed among authors. With these key concepts, data were iteratively reviewed, categorized, and reduced to main ideas [43, 44].

IV. FINDINGS

We first discuss the six types of information practices—capturing, reviewing, manipulating, representing, interpreting, and sharing information—that we found among young adults in the context of fitness and food journaling. We then discuss the ways in which these information practices embody different levels of reliance on health-tracking technologies.

A. Information Practices in the Context of Health Tracking Technologies

Based on Savolainen's concept of information practices [10], we identified specific information practices in the context of fitness and food journaling: capturing information, reviewing information, manipulating information, representing information, interpreting information, and sharing information. This practice-focused lens frames our findings and examines how information practices are transformed and evolve with the everyday life project of journaling fitness and food.

For clarity's sake, we list each practice separately, perhaps giving the impression that these practices are independent of each other. However, it is important to note that "*practices are interconnected*" because they are naturally enacted recurrently and collectively [34]. Thus, the information practices we discuss are intertwined, and shape and reshape each other. For example, data regarding fitness or diet were logged and represented in simplified forms or formats, and most participants were reluctant to share this data; here, we see a relation between the information practices of manipulating and sharing information. As another example, if the data were interpreted as extraneous, participants often refused to further capture, keep, or share that information with others (a relation between interpreting information and the capturing, reviewing and sharing of information).

1) Capturing Information

Captured information from this practice often becomes a source for monitoring or logging information. Participants usually obtained information about workout performance records, such as distance running, duration, calories burned, or nutrition information from technologies such as mobile applications, while or after work outs or meals. For example, P2 mentioned that "*I just take a picture and then bring it home and then before I go to bed or whenever I don't feel like studying I just log all my workout, diet, and finances. [A]fter workout, it [the work out performance record] pops up on the treadmill or elliptical, [and] I take a picture of it*". Some participants said that they frequently checked miles and speed from their mobile applications while or after running to get

some sense of their ongoing workout. In the context of food intake, participants found nutritional information provided by mobile applications useful.

2) Reviewing Information

Reviewing information incorporated the overall activity of tracking or keeping what an individual has logged. Whether or not participants reviewed information tended to depend on whether their past logs were informative or useful. For some, the only time they went back to review past logs was to diagnose certain ailments, such as suffering from injury or feeling fatigued for no apparent reason.

However, some participants reviewed their fitness or food intake logs more frequently. These participants wanted to track their progress in terms of physical activity and to be more careful about their diet. In a similar vein, they pointed out that while reviewing their logs, they checked whether they had kept their workout patterns structured. Participants used their past logs as a guide on which exercises they needed to do next or more frequently. Participant 3 explained, “*It was important for me to be able to remember what the workout was. If I really wanted to do it again it would be easier for me to go back and find it than if I had to think about a whole new workout.*”

3) Manipulating Information

Manipulating information is the activity of editing recorded information. It involves the related practices of updating, deleting, integrating, or dividing information into different categories. Participants actively examine what to record and in what format. This practice decides the amount information to be kept and its format. Participants manipulated information differently according to the type of media they used. For example, P1 would either log dates or the names of the workouts depending on the medium: “*Here [a paper notebook] I’m logging the dates, whereas the calendar I’d be logging the workouts.*”

A majority of the participants tended to categorize information as binary (dichotomous). For example, rather than logging the names of their fitness classes or exercises, they were only concerned with whether they exercised or not on certain date or whether they attended the class or not. For food journals, only the names of foods they had eaten were logged rather than the timings or nutrition information. They used the format for its simplicity. P2 noted, “*Pilates I can’t really log, I mean I measure whether I did it or not... I just [write] the day Monday, Wednesday, Thursday...*”

4) Representing Information

Representing information involves the practice of visualizing recorded information. This information was represented in various forms of texts, numbers, marks, colors, or matrices for each participant. Some participants drew circles; others did checkmarks to mark the exercise they had completed. For each person, a checkmark had a different meaning: pointing out a completed workout or something that had changed in his/her workouts or diets. By using different colors or shapes of marks, information could be readily and easily identified with different meanings. Some participants preferred having the ability to gain a global view of all their logs at once; these participants wrote all the details of their

logs in one central location (e.g., excel sheet, calendar). P2 stated that “*...so I felt like maybe I have to have a big picture of it, in Excel I can have a big picture and then you can go in detail if you want to...*”

5) Interpreting Information

Interpreting information includes the practice of assessing the value, usefulness, or importance of information. Specifically, interpreting information was deeply related to perceived accuracy, reliability, and future usefulness. How participants interpreted information has to do with the degree to which they valued that information. To keep track of her fitness level, P2 thought it was worthwhile to only keep her recent fitness logs to compare with her current activities: “*I don’t mind losing it [my fitness logs in the past] but for February and this month I don’t want to lose it.*”

6) Sharing Information

Sharing information is the practice of giving information to or receiving information from others. Participants rarely shared their fitness or diet logs with others, although most participants were willing to share information with their close friends or family face to face or in texting. In this regard, P3 mentioned that “*I share my running data with my friends all the time and with my family back home like oh if I’m proud of something I’ll take a screen shot and [say,] ‘Look I did this.’*”

B. Different Levels of Reliance on Technology Depending on Types of Information Practices

As noted, the specific health-tracking information practices our participants engaged in include: capturing information, reviewing information manipulating information, representing information, interpreting information, and sharing information. We focus on the materiality of practice by unpacking how technology contributes to shaping or reshaping certain practices [46].

To frame our examination of technology and information practice, we identify where information practices lie on their level of reliance on digital technologies, in particular health-tracking technologies. As such, a low level of reliance on digital technology means relying on non-digital technologies/media such as paper. We found that when health-tracking technologies assumed a significant role in supporting an information practice, it left little room for human agency and non-digital technologies. For example, health mobile applications or activity tracking devices allowed participants to automatically log and keep large amounts of data. In terms of the information practices of manipulating, representing, and interpreting information, we found low levels of reliance on technology among our participants. Figure 3 maps out the different levels of reliance on technology and associated information practices. “Generic” technologies refers to non-health specific technologies (including traditional ones like paper). For instance, Figure 3 shows that the information practice of sharing often had a low reliance on technology—face to face was the means by which our participants shared their data.

The participants in our study all grew up with digital technologies around them. Yet, we found that digital and health-specific technologies failed to support their information

practices in journaling of fitness and diet. For this reason, according to participants, they often felt that such technologies were the proverbial white elephant, despite smart technologies being indispensable in other parts of their lives. Non-digital technological artifacts, such as paper and pen, often worked better for certain information practices depending on life context and situations of the participants.

V. DISCUSSION

Our findings raise the question of why specific information practices in health tracking are tied to different levels of technology reliance. We suggest two reasons; (1) users' life contexts considerably influenced the role of technologies in achieving information practices; and (2) current designs of health-specific technologies only barely support certain information practices, leading participants to seek generic, and more traditional (and possibly more flexible) technologies such as notebooks. Specifically, we show how technologies enable young adults to perform certain information practices and how those practices reshape the way in which certain types of technologies are preferred for logging fitness activities and food intake.

A. Life Contexts Shape the Interplay Between Information Practices and Digital Technologies

We examined how life contexts influence information practices and usage of different types of technologies in those practices. Our use of the term life contexts in this paper was inspired by the “contextual factors” of Savolainen’s model in everyday information practice ([10], p.65). He describes contextual factors in the model as factors that influence when an information practice is processed or implemented. While he stresses “situational” factors such as time constraints (e.g., how quickly something needs to be done), we found in our data that personal factors such as one’s personal goals and habits were major influences on information practices as well. Therefore, our concept of *life contexts* embraces both the situational and personal factors of daily life. In our work, how a certain technology was appropriated to achieve a certain information practice for logging fitness and diets depended on life contexts. We discuss three particular life contexts that were evident in our findings: daily routines or habits, time constraints around practices, and one’s current fitness goal.

1) Habits

One reason young adults had a high reliance on old technologies in their information practices is due to “habit”: routinized life contexts and habitual uses of technologies. Orlikowski [47] describes how practices could be shaped depending on how routinized they are in one’s life.

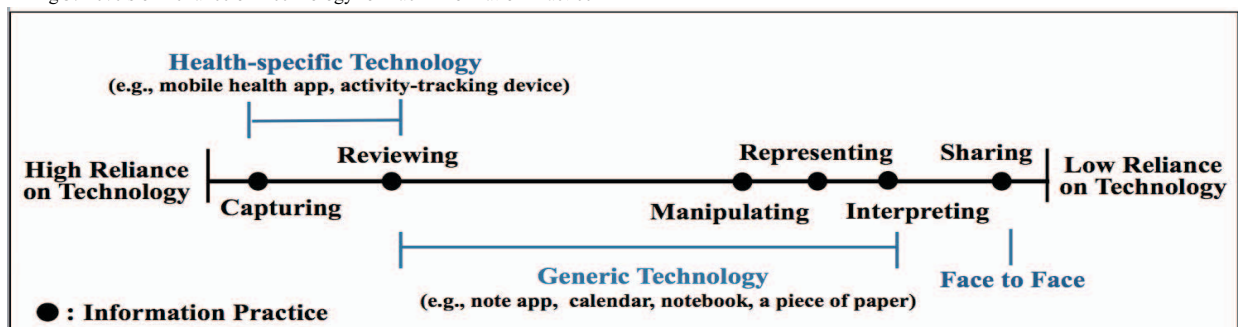
For journaling fitness and food with technologies, individual habits affected both adoption of technologies and how information practices were conducted.

We found that technologies gained inertia when they became part of a long-held routine of exercise and nutrition. Once a certain technology was established in a routine, the same or similar technology tended to be adopted when participants were seeking new devices in new environments. For example, participants who had used workout cards in a gym chose to use a paper notebook at a new gym instead of a smart health tracking technology. Similarly, those who had used a paper calendar adopted notebooks or paper as their new means for journaling fitness or food intake. Such habitual uses of types of technology are not, we believe, due to disparities in how comfortable or familiar our participants were with certain smart technologies—all of our participants considered themselves heavy users of mobile technologies. Besides routinized uses of technologies, routinized patterns of diet or fitness also affected how information practices were embodied in technologies. For example, participants who ate every one of their meals in the campus cafeteria noted that due to the relative consistency of their daily diet, it was easier to type nutrition information manually into their mobile application, which might be time-consuming for others who had a variable daily diet.

2) Time Constraints

Time constraints were important factors in a life context that influenced the decision to conduct information practices using older technologies. Time considerations made a particular difference in the ways participants logged, manipulated, and represented information. Most participants tried not to spend too much time recording information because of their busy school schedules and would manage their logging practices accordingly. Time also influenced the preferred tools for logging: we found that our participants gravitated towards logging in notebooks or a piece of paper. For example, because of the time required to enter each number into an application, P7 said that she preferred using paper to write down her records of strength training rather than using a mobile application or other smart technologies. She noted: “*You have to figure it [using mobile application] out and I find that’s such a waste of time. It [logging weight training] is a lot more detail to have to write down: reps and stuff like that. It only takes a minute to write down times and stuff like that.*” Some participants favored recording their fitness records or food intake manually because they thought that it would be quicker to customize log formats that comported with their fitness-related goals. Keeping a log in different colors or with a particular shape of check marks could help them identify things

Fig 3. Levels of Reliance on Technology for Each Information Practice



quicker, which could not be easily achieved with current mobile applications or activity tracking devices.

3) Current Goals

One's own health or fitness-related goals were a major constituent of life context that influenced the interplay of technology and the practice of interpreting information. More specifically, whether or not our participants had specific fitness and diet goals changed the role of technology in their information practices. Participants pointed out that when they set a new goal, they were willing to change their current technologies and ways of journaling. P3 stated that *"I want to keep my running logging the same because I really like it. I think in the future it might be important for me to keep more detailed written records, but I don't have any active plans to change the way I record."*

In this regard, the reliance on technology in information practices can be restated as "reconciling [one's] own goals with [the] materiality of a technology" ([46], p.154). Here materiality means the physical properties and forms of the device [35].

4) Summary: The Relation Between Technology Reliance and Life Context

By looking at users' everyday practices, life contexts gave an account of why participants preferred to use certain artifacts (i.e., rely less on smart technologies) rather than health-specific digital technologies when logging fitness and diet. Those choices stemmed from a combination of users' habit, time-constraints, and fitness goals, which gave users more control over their technological practices. Therefore, when it comes to achieving each information practice, the process was one of balancing or negotiating between technological reliance and one's life contexts.

VI. CONCLUSION

It is natural to believe that college-aged students would be more likely to adopt health-tracking technologies into their daily lives. However, as we have shown, our young adults have personal and pragmatic reasons for relying on technology to varying degrees, depending on the information practice of interest. In this paper, we examined how health tracking technologies are involved in a young adult's life by unpacking the information practices and specific technologies used when journaling fitness activities and diets. A practice-based approach proved useful in exploring the what, why, and how of health tracking technologies in non-clinical settings.

It is important to reflect on a key disconnect we found between what information practices health tracking or other smart technologies attempt to support and what young adults actually do. That is, the design of many health-tracking technologies is meant to support a wide range of activities that fall under the information practices of manipulating, representing, sharing and interpreting information practices.

Yet, young adults fall back on "older" technologies for some of these information practices. Our college-aged students only consistently used activity tracking devices and mobile fitness applications for information practices such as capturing and reviewing information. Participants logged their fitness

and food intake manually rather than relying on smart health technologies. Many participants in our sample simply didn't believe that technologies could (perhaps ever) manage their fitness and food intake journaling in particular ways they preferred. P4 mentioned her frustration with smart technologies: *"I like to visually see how it is, I like to format things the way that I want to do it. I like it to be organized a certain way and [with] electronics you only can usually do it a couple ways, you know you have to do it a different way and...I don't want pages to scroll through, different data to put in."* This is not simply a usability issue, but an inadequacy in how technologies integrate with life contexts and information practices in health activity tracking.

Intertwined with the information practices we observed is the issue of how technologies integrate one's life contexts. Smart health-tracking technologies were able to take on a vital role in certain information practices because in those practices, life contexts could be successfully put in the background with little repercussion. Unfortunately, current designs of smart health technologies do not adequately support some user's distinctive life contexts. For example, activity-tracking technologies did not take into account a users' physical condition, user's fitness goals, the current weather, or how steep the route was, even though those factors may have affected one's physical activities. For example, P8 felt pressured to push herself—sometimes too much—when her running application would notify her to continue running at her current pace. It did not account for the other contexts in her life that may have impacted how she felt that day. Participants simply found alternatives such as an old-fashioned notebook when the devices did not support their life context, rather than attempting to appropriate modern technological tools to fit their needs. This implies that a way to somehow capture a user's life contexts would help designers meet the evolving users' needs and life circumstances [48].

Thus, we suggest that health-tracking devices need to consider this triumvirate of concerns: information practices of health tracking, life contexts, and technological reliance, all of which we consider intertwined. This does not necessarily imply that a mapping between information practices, life contexts and technology reliance is invariable. Yet, by understanding what influences people to adopt older, manual technologies for certain practices, designers can perhaps try to develop devices and applications that integrate what these older technologies do best into their interfaces. For example, applications may change their interfaces depending on a user's life contexts such as time constraints and goal setting. Combining the benefits of traditional technologies with the benefits of newer health-tracking technologies may mean that designers need to put their efforts into supporting a limited subset of information practices that seem well suited for computational support and allowing for more manual means of information practices to interoperate with smart technologies. P5 summarizes it best:

"[T]echnology isn't always the best for everything...[J]ust because it's easier...doesn't mean that it's always the best option. Sometimes it's better to go old fashioned and [write] on a piece of paper and maybe sometimes [when] researching something it's better to use a laptop."

To conclude, we summarize our key contributions. First, through a practice lens, our study is one of the first to elucidate the real-world health tracking practices of young adults and their use of tracking technologies. We found the key practices of capturing, reviewing, manipulating, representing, interpreting, and sharing information.

Second, we find that young adults use a mix of health-specific technologies with physical (e.g., non-digital) artifacts to support their fitness and diet tracking practices. In particular, we found that certain information practices of young adults were more reliant on health-specific technologies, while other practices were more reliant on physical artifacts. This mapping points to a second contribution of this paper.

Lastly, our findings suggest that there is a disconnect between what practices health-tracking technologies ambitiously seek to support and the actual integration of such products in users' real practices of health and fitness. Namely, among young adults, while smart technologies were indispensable in particular parts of their lives, "older" technology such as paper and pen, often worked better. This suggests that technologies for health-tracking need to consider a wide-spectrum of practices involved in health and fitness, some of which are better suited to ubiquitous devices, and some of which are better suited for other media.

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