Evaluating Mobile Apps Targeting Personal Goals

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ABSTRACT

Goals are fundamental to everyday life and are reflected in the growing HCI research in personal informatics and behaviour change. Besides academic work, a wealth of commercial mobile apps have also been developed to support users in setting their goals and achieving them. Despite their popularity, such apps, however, have been limitedly evaluated. We report a functionality review grounded in auto-ethnography and expert evaluation of the 21 most popular such apps selected from 1336 apps on the Google Play Store. We used a hybrid approach based on goal-setting theory for the evaluation. Findings indicate the more nuanced functionality of goal capturing, extending those explored in previous work for goal setting, monitoring and maintaining motivation. They also highlight the importance of distinguishing between high and low-level goals and their domains since most apps support multiple rather than individual goals. We conclude with design implications to support the setting of multiple personal goals at both high and low levels and across different domains, the use of consistent terms for distinguishing goals at different levels, and for visualizing the relationships among multiple goals.

CCS CONCEPTS

• **Human-centered computing → Human computer interaction (HCI)**.

KEYWORDS

Goals, Goal setting theory, Goal capturing, Goal tracking, Goal monitoring, Motivation, Goal domains, Maslow's hierarchy

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1 INTRODUCTION

Goals are important in everyday life across various domains such as work, study, leisure, health, finance, or self-actualization, but pursuing and achieving them is challenging, as reflected in the prevalence of procrastination [1], suboptimal diet [3], physical inactivity [20], financial debt [12], or unrealized potential [42]. Goals are defined as internal representations of desired states [5], and conceptualized by a range of theories, some of the most common ones being goal setting theory [34], self-determination theory [48], self-regulation theories [6] [52] [13], transtheoretical model [47], or Vroom's expectancy theory [25]. Although developed with an initial focus on workplace settings, goal setting theory has been extended [36] [37] to goals in other domains such as sports, education, health care, creativity, psychotherapy, and entrepreneurship, with a rich body of empirical research underpinning it.

In HCI, goal setting theory has been one of the most common theories applied in both personal informatics, and behaviour change research for the design of technologies targeting goals across various domains such as fitness [16][8][28], mental wellbeing [27], or digital wellbeing [2]. Despite the progress made in designing technologies to support goals, challenges remain, as reflected in the high attrition rate and limited user engagement [29] [30].

To address this gap, our work focuses on the design features supporting goal capturing, monitoring, and maintaining motivation provisioned by the commercial apps on Google Play Store, analyzed through the lens of goal setting theory. While such mobile apps represent one of the various technologies targeting goals, our findings and insights aim to articulate novel design implications supporting both mobile apps, as well as goals-focused technologies more broadly. Thus, our work extends HCI research on goals-based technologies with a focus on the most popular apps targeting goals. While limitedly explored, such commercial apps have the potential of embedding novel design knowledge supporting their adoption, or despite their popularity, they may also have built-in problematic design features which could be addressed through novel design implications to better support users' goals.

2 BACKGROUND

This paper draws from HCI research on personal informatics and behaviour change, which has focused predominantly on goals across various domains and in particular, fitness, health, and digital wellbeing. In the fitness domain, relevant work includes the evaluation of fitness apps using goal setting theory [8], which revealed that although monitoring is conveniently adopted, the strategies of goal setting were not, such as tailoring goal difficulty with respect to the user's ability. Another study [16], emphasizing the importance of self-set goals, suggested that self-set goals can be integrated with expert options and recommendations in a scaffold format. An in vivo study [22] suggested the inclusion of proximal goals or micro plans for immediate actions as a feature in activity trackers. In the domain of digital wellbeing, goal reminders were shown to be effective in limiting social media use [40], and that self-monitoring can control screen time, thereby increasing productivity [2]. A recent study [33] differentiated low-level and high-level goals as values and goals based on activity theory.

Despite its importance, goal setting [24] is not trivial involving awareness of contextual information. Additional challenges of goal

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setting include users' limited awareness of goals relevant for their needs [14], lack of expertise for pursuing such goals [41], limited self-efficacy, and indecisiveness due to lack of predictability in lives [14].

HCI work has also focused on digital behavior change interventions for a range of applications including those for fitness, work productivity, or emotional wellbeing, whose design has been informed by goal setting theory. For instance, Ubifit system [16] introduces goal setting, the option of goals being defined by the user and the time frame for completing them. StickK [32], an online goal setting platform promotes goal commitment through the financial incentives for different recipients such as friends or charities. Stress is a web-based system [27] aiming to tailor the goal difficulty to ensure the optimum balance between goal's difficulty and users' self-efficacy. Providing a theoretical framework [46], Pinder and colleagues argue for the inclusion of habit-forming or habit-breaking strategies for behaviour change with the consideration of type 1 and type 2 processes that trigger contextual to a setting.

Related to goal tracking, Schroender and colleagues [50] raised concerns about the alignment between the goals people have and the tracking functionalities that interventions readily provide. They proposed a goal-directed self-tracking system that can cater to users' personalized goals and evaluated it using a conceptual prototype developed for the specific domain of migraine management. Within quantified self movement, self-experimentation or studies exploring the outcomes of specific behaviour change interventions have been conducted in areas such as sleep [18] [19] and chronic health conditions [26], and also in generic contexts [17].

To conclude, most of previous research has focused predominantly on single goals within a specific domain, with most technologies monitoring them through measures that could be easily tracked either by automatically logged data or user entered data.

3 METHOD

To identify the apps, we searched Google Play Store for free apps using keywords informed by goal setting theory [38] namely goal setting, goal commitment, goal resources, and goal pursuit, as well as keywords that can facilitate goal setting processes: goal awareness, goal management, goal planner, and long term goals. The search was performed in the fall of 2022, and from the initially returned 1336 apps, after removing duplicates, we had 562 unique apps for which we set the inclusion criteria of having at least 50,000 installs, a minimum of 4.7 average rating out of 5, a relevant description on the marketplace, and that they target goals. This selection process led to the final set of 21 apps (Table 1), 14 of which were also available on Apple Store.

To evaluate the apps' functionalities, both authors interacted with the apps as HCI experts. Apps were installed on the devices for at least 2 weeks, and used daily to explore the data associated with goal monitoring. The cumulative time spent on each app, over the duration of the study, ranged between 30 minutes to 2 hours, with an average of 1 hour per app. The first author evaluated all 21 apps on an Android 11 phone, while the second author evaluated 4 apps on an iPhone 12 to revise and reach an agreement on the specific functionalities. These were identified both top-down and bottom-up. The former approach was performed by employing the core components of goal setting theory [37] such as goal level (high or low-level goals), self-setting goals, goal support, feedback on goal progress, or rewards [31]. Functionalities were also identified through a bottom-up approach as informed by the reviewed apps reflecting either sub-functionalities of the ones identified through the top-down approach, such as tracking goal content and tracking high vs. low-level goals, or new functionalities, such as setting single or multiple goals and their domains, as well as the structure of goals for which we used the Maslow's hierarchy of needs [43]. Through thematic analysis, the identified functionalities were grouped under three themes: Goal capturing, Goal monitoring, and Maintaining motivation.

4 FINDINGS

This section presents in detail each of the three main functionalities of goal capturing, goal monitoring and maintaining goal motivation, together with their sub-functionalities as summarized in Table 1. This description is preceded by a reflection on the validity of the apps. In this respect, an important outcome is that no apps specified any theoretical underpinning that could have informed their design, such as goal setting theory. Although 2 apps referred to self-help books (Focus: Organiza tu vida app), or a 3-stage habit-building method (Habit Tracker - Habit Diary), none provided academic references. In addition, none of the apps reported evidence-base such as user studies for the evaluation of their effectiveness.

4.0.1 Goal Capturing. An important finding is that all 21 apps provide users with the capability to set goals, and all of them support the setting of user-defined goals that may be arguably more personally relevant. This is supported by goal setting theory which mentions the value of the participation of people in setting their own goals [31]. In addition to self-set goals, 9 out of the 21 apps also provide system-generated goals that users can select from. This is an important feature, sensitizing users to the broader set of goals that they may wish to consider in order to set their personal goals from a better-informed position.

Also significant is that more than half of the apps (12 out of 21) support the setting of goals from multiple domains either by being open-ended (5 apps) or by prompting multiple domains (7 apps) rather than restricting them to a single domain. The remaining 9 apps support goals exclusive to a single domain, such as self-determination (6 apps), finance (2 apps), and career (1 app). We defined goal domains as clusters of related goals, which research on goal taxonomy has differentiated between social cluster, which includes goals related to family, friends, or giving to others, and individual cluster, including goals related to achievement, education, career, personal growth, or finance [9]. These findings are interesting, given that most HCI research on goals has focused mostly on single goals within one domain [40] [16] [27]. This is important since setting and striving for multiple goals permeates our lives, yet we know little of how to support them as clusters of goals rather than merely as sole goals.

Regarding goal level, study outcomes show that both system-provided goals and user-generated ones can be differentiated in terms of their level of abstraction as low-level goals. and high-level goals While the former goals are specific, usually immediate or short-term, involving actions that can be directly observed or

	Goal capturing							Goal monitoring					Maintaining motivation	
App name	**User or system defined**	**Goal domains**	**High-level goals (terms)**	**High-level goals (data entry)**	**Low-level goals / means (terms)**	**Low-level goals (data entry)**	**Goal structure (visual)**	**Monitored goal content**	**Monitored means content**	**Monitored measures**	**Tracked frequency**	**Goal deadline**	**Rewarding feedback**	**Punitive feedback**
21 Days Challenge	Both	Personal growth, self-determination, wellbeing, friends, family			Challenges (are habits)	Free-text	high-low goals		Activity within app, completion againsts target (21 days)		Daily	End of day 21	Points	Color
7waves: objetivos e metas	User	Education, career, finance, health, spirituality, wellbeing, friends, family	Goals	Free-text + drop-down + resources (time, money)	Activities	Free-text	high-low goals	Marking completion	Marking completion		Custom	Custom	Milestone badges	
aTimeLogger - Time Tracker	User	Self-determination			Goals (are habits)	Free-text + drop-down + duration	high-low goals		Time spent		Custom			
Boosted Time Tracker	User	Self-determination			Projects & tasks	Free-text + color label	high-low goals		Marking completion, time spent					
Flynow - Tasks, Habits & Goals	User		Goals	Free-text + drop-down	Tasks, checklists & habits	Free-text + drop-down + target value + unit		Marking completion	Marking completion, time spent		Custom	Custom	Points & milestone badges	Color
Focus: Organiza tu vida	User	Achievement, education, safety, career, personal growth, self-determination, wellbeing, spiritual, finance, freedom, friends, family, support, giving to others, recognition	Mission statement, roles & goals	Free-text + drop-down	Plans & habits	Free-text + drop-down	high-low goals	Marking completion	Marking completion		Custom	Custom		
Goal Tracker Workout Calendar	User	Self-determination			Goals (are habits)	Free-text + from date			Marking completion		Custom	Custom		
Gratitude: Self-Care Journal	Both		Vision board	Free-text + drop-down + media				Manual updation			Daily			
Habit Tracker - Habit Diary	Both	Personal growth, self-determination, wellbeing, finance, friends, family			Habits	Free-text + drop-down + type: good / bad / one-time + labels (icon & color)			Marking completion, time spent		Custom		Milestone badges	
Habit Tracker Planner HabitYou	Both	Safety, career, personal growth, self-determination, wellbeing, finance, friends, family			Habits	Free-text + radiobutton (type) + drop-down + label (part of the day)			Marking completion, value against target		Custom		Milestone badges	Border & color
HabitNow Daily Routine Planner	User				Habits, tasks & checklists	Free-text + target value + quantifier (<,>) + timer + checklist + drop-down			Marking completion, value against target	Custom unit	Custom	Custom	Milestone badges	Color & icons
Intellect: Create A Better You	Both	Personal growth, self-determination, wellbeing, career, friends, family	Goals	Free-text + pick from checklist	Daily routine			Marking completion	Activity performance within app		Daily		Milestone badges	
Loop Habit Tracker	User	Self-determination			Habits	Free-text + color label + units + target value			Marking completion, value against target	Custom unit	Custom			Color
Milki - Pomodoro Study Timer	Both	Self-determination			Time spent	Free-text + drop-down			Time spent					
monday.com - Work	User	Career			Tasks	Free-text			Marking completion					
Mood Tracker Self-Care Habits	Both	Personal growth, self-determination, safety, wellbeing, friends, family			Habits	Free-text + icon label			Marking completion, value against target	Limited	Custom		Points & badges	Color & emoji
MyMoney—Track Expense & Budget	Both	Finance			Budgets	Number	high-low goals		Income & expense amounts	Money	Daily	Month end		Color
Productivity Challenge Timer	User	Self-determination			Projects & sub-projects	Free-text + durations			Marking completion, time spent				Milestone badges	
To Do List	User				Tasks	Free-text			Marking completion		Custom	Custom		Color
To-Do List - Schedule Planner	User				Tasks & sub-tasks	Free-text + drop-down + checklist	high-low goals		Marking completion		Custom	Custom		Color
Wallet: Budget Expense Tracker	Both	Finance			Goals & Budgets	Number + drop-down + labels (emoji, color)	high-low goals		Income & expense amounts	Money	Custom	Custom		Color

Table 1: Top-rated apps targeting goals and their main functionalities such as Goal capturing, Goal monitoring, and Maintaining motivation

measured, the latter are more abstract, and usually in a distant future, reflecting values, identities, or roles, therefore not easily measured [7]. Goal setting theory defines goal specificity as the level of precision in describing when the goal is achieved through quantitative measure [39], and that low-level goals such as means tend to be more specific than high-level goals [35]. Findings show that 5 out of 21 apps supported users to set high-level personal goals, while almost all apps (20 of the 21 apps) supported users to set low-level goals or means.

We now describe how these 5 apps support users in setting high-level goals. Important here is the terminology being used, with most of them (3 apps) using the simple term "goal" without specifying that this is a high-level goal or explaining what a high-level goal is. Two other apps provided additional terms, such as 'vision', by the 'Gratitude: Self-Care Journal' app, which helps people make vision boards. The other app, 'Focus: Organiza tu vida' provided a valuable set of reflective questions during the onboarding process targeting high-level values and identities. Questions such as *'I am*

at my best moment when...', 'My natural gifts are...', 'If I had unlimited time and resources, I would...', 'What tribute statement would you like on your 80th birthday?', are likely to prompt users to identify their high-level goals, defined in the app as roles, goals, and a mission statement.

With respect to low-level goals, findings indicate an even richer set of terms for capturing them, The term 'Habits' was the most frequently used (7 out of 20 apps), which tends to capture tasks performed repeatedly over time. Another app, 'Intellect: Create A Better You' referred to habits ordered within one's daily schedule as 'Daily Routine'. The second-most used term for low-level goals was 'tasks' (5 out of 20 apps) used to capture discrete and small items of activity performed within a single unit of time. A related term was 'checklist' used by 2 apps to capture tasks involving more than one item of activity whose completion can be marked.

Other terms reflect multiple tasks and include 'activities', 'challenges', and 'plans' which were used by 1 app each, and 'project' was used by 2 apps. Interestingly, the term 'goal' was also used in reference to low-level goals by 3 apps. However, 2 of these apps used this term inaccurately as they actually capture habits 'aTimeLogger - Time Tracker' and 'Goal Tracker Workout Calendar'. The third app: 'Wallet: Budget Expense Tracker' used the term 'goal' to support users in setting personal financial goals, albeit low-level ones or means, such as saving a specific amount of money. The 2 finance apps also used the term 'expenses' for setting category-specific budget limits such as food and clothing.

Findings indicate that all 21 apps provide modalities for data input in order to capture both high and low-level goals. While many modalities such as drop-downs, checklists, and custom labels leveraging colors, emojis, and icons were used, free-text was the most common modality.

An interesting outcome regards apps' support for capturing in the goal-setting stage, the initial state of the goal. This functionality was supported by only 3 apps. We argue that making explicit such initial states is important in order to set realistic goals and deadlines for achieving them. These 3 apps include the 2 finance apps allowing users to capture such initial goal states as current savings towards financial goals of buying a car, for instance, or as current expenses towards keeping within budget. The third app is '7waves: objetivos e metas' which supports the setting of wellbeing goals by directly asking users: *'How much have I walked to that objective?'* on a 10-point Likert scale. For qualitative goals, this can be one way of gathering such information, whereas, for quantitative goals, the initial value of the measure can be noted at the starting point.

Another important finding concerns the goal structure or the organization of multiple goals and how the apps support users to engage with them. Surprisingly, despite focusing on multiple goals, no apps captured the goal structure nor provided visualizations of it. The only relationship between goals captured by apps is that between a high-level goal and its low-level goals or means. One exception regarding such visualization concerns the '7waves: objetivos e metas' app which provides a radial chart capturing all goal domains within a 'Life Wheel' but this structure is limited to goal domains only, failing to capture the relationships among all high-level goals and their means.

Although no app explicitly mentioned Maslow's hierarchy of needs [43], the coverage of each level of Maslow's hierarchy was present in 13 to 16 apps, for instance, with goals related to sleep and nutrition reflecting physiological needs, goals related to health and career reflecting safety needs, goals related to relationship and vacation reflecting social needs, goals related to studies or career reflecting ego needs, and spiritual and self-growth goals reflecting self-actualization needs. These findings are important, suggesting the untapped potential of such apps for capturing not merely multiple goals, but also the relationships among them, like in Maslow's hierarchy.

4.0.2 Goal Monitoring. After users have set goals, they can monitor their progress towards achieving them, a functionality supported by all 21 apps. Findings indicate that a straightforward self-report of goal completion is the most common form of marking achievement for either high-level goals (5 out of 5 apps) or low-level goals (13 out of 19 apps). For this, apps use either a 'Mark goal as achieved' button, or a radio button with Yes (if the goal was achieved) or No (if the goal was not achieved). The button-based interaction provides no option to undo the selection upon marking, but the radio button allows it to be unmarked, which is a useful feature for error prevention. While marking achievement is a one-off measure of goal progress, namely at the end of the goal pursuit, other measures reflect 'marking progress'. From the 21 apps, 12 apps provided specific measures for marking progress, such as the time spent on specific activities (6 apps; however, no app captured the target time duration), time which is tracked through a timer, or the amount of savings monitored against income and expenses (2 apps). In addition, for low-level goals, besides marking completion, 4 apps allowed for the submission of specific target values or counts reflecting the goal means, such as the number of push-ups performed, or the number of book chapters read in a day.

An interesting outcome is that only 14 apps provided the option of selecting a deadline for goal achievement. Such a deadline can be defined by the user as a specific date in the future (12 apps) or preset by the app (2 apps).

Findings show that measures associated with goals were provisioned to be captured by only 5 apps and that only 3 apps captured both measure and deadline for specific goals. This is surprising since goal measures and deadlines are key for monitoring progress and taking corrective action towards goal achievement if progress is unsatisfactory, an option provided by only one app: 'Wallet: Budget Expense Tracker', in the form of recommendations for daily spending in order to keep within the allocated budget. Such recommendations are indeed critical for goal achievement, reflecting the value of 'performance feedback' advocated by the goal setting theory [37], which is necessary so that users can gauge whether a change in effort or strategy is needed in order to correct their ongoing course towards goal achievement.

To support monitoring, most apps provide the option to track goal progress, with tracking occurring at different frequencies. Thus, the most common frequency of tracking goal progress was defined by the user (13 apps); while the second common frequency was 'daily' and set by the app (4 apps). Interestingly, 4 apps did not provide any such frequency for tracking progress, with progress being captured only when users deliberately update their progress, albeit as a one-off update rather than as regular ones at a set frequency. All 17 apps that provided a frequency option for tracking goal progress,

also leveraged the functionality of mobile notifications for sending reminders to nudge participation in goal pursuit, and for tracking goal progress.

4.0.3 Maintaining Motivation. Maintaining motivation is challenging [49], yet key to ensure goal achievement [39] Findings indicate the limited use of features providing support for maintaining motivation. Such features include mostly rewarding (9 apps) or punitive feedback (10 apps), but no social support (0 apps). The rewarding feedback included features such as milestone rewards for instance halfway through the goal progress in the form of badges (8 apps), points (3 apps), inclusion in leaderboards (4 apps), motivational quotes (2 apps), or visually pleasing animations (1 app). The latter is provided by the 'Intellect: Create A Better You' app to encourage engagement with meditation through breathe-in-breathe-out animations. Motivation is also within goal monitoring, through the use of colors such as green to represent progress towards the target and red to represent lack of progress and need for corrective actions (9 apps).

Motivation through social support has been limitedly leveraged in the reviewed apps, probably given their focus on personal goals, which are not by default shared with others. One exception is '21 Days Challenge' app which supports users to share their responses to questions such as *'My biggest dream is...'*, as anonymous posts in their online community feed so that users could see responses from others. This may be a problematic feature if others' feedback lacks sensitivity or the support needed to nurture one's dream. We also know little about the impact of sharing the progress of communicable goals within social media, or close social ties [23] [15].

Also regarding motivation, we also looked if apps provided support for users' understanding of goals, and focused on users' profiling in order to better assist users in the setting of their personal goals. With respect to the former, findings also indicate limited provision for psychoeducation on goals and their key concepts (5 apps out of 21). This is a missed opportunity that could have been relatively easily addressed in the app onboarding process. Regarding the latter, findings indicate that user assessment was incorporated by only 2 apps during the goal setting stage. One of these apps is 'Habit Tracker - Habit Diary' offering custom journeys towards habit formation as a paid feature, which includes an 'adaptive assessment' period for the first 7 days of habit formation journeys. The other app 'Intellect: Create A Better You' also accommodated a similar journey feature including a personality assessment quiz, used for recommending activities of self-reflection as a part of daily routine.

5 DESIGN IMPLICATIONS

In summary, the functionalities were only partially put into practice. Widely implemented functions include the provision of goal setting, self-setting capability, presence of low-level goals, usage of different data entry modalities, monitored deadlines, and tracking frequency. Functionalities partially found in applications include system-recommended goals, supporting goals from multiple domains, and rewarding or punitive feedback. On the contrary side, the applications were lacking in validity or theoretical underpinning, capturing high-level goals, measures, and initial states, using consistent goal terminology, visualizing structure, and social facilitation for maintaining motivation. Given the high reach of the selected 21 mobile applications (2 million average downloads per app), we believe that the inclusion of missing functionalities will have a wide impact on users and drastically improve the utility of such mobile applications.

Our evaluation contributes to the understanding of the current state of functionalities of industry apps targeting personal goals. We now suggest design implications for mobile applications, which can also be applied to broader goal-setting technologies regardless of their base platform or technology.

5.1 Support User-defined Goals Across Multiple Domains

Findings indicate apps' strong support for user-defined goals whose value has been argued for in goal setting theory; namely, people's participation in goal setting is crucial for their commitment to the goals [31]. Almost half of the apps also provide lists of possible goals which can scaffold both users' choice of goals or the generation of their own goals. With regard to domains, more than half of the reviewed apps scaffold such options beyond the constraints of one single goal domain such as health or finance. This is a key finding contrasting most HCI research on goal technologies where the focus has been on single goals usually in single domains [40] [16] [27] [22], and not commonly defined by the user. We suggest prioritizing the option of user-defined goals and extending it with that of system-suggested goals across multiple domains in order to better support personal goal setting and users' commitment to them. Promising starting points for the goals domain are theory-informed such as Maslow's hierarchy [42] or empirically-informed such as different taxonomies of goals [9] [21].

5.2 Support User-defined High-level Goals

Almost all apps support users to set low-level goals but only a quarter of apps support the setting of high-level goals. This confirms the dominant focus on low-level goals in HCI research on goal-related technologies. However, capturing high-level goals are important, as although less specific [39][35], they act as guides and incentives for goal achievement [7]. The 5 apps supporting high-level goals provide some interesting functionalities for setting them which can be articulated as design recommendations. This includes using reflective questions to provoke thinking of high-level goals.

5.3 Consistent Goal Terminology

Findings indicate that the reviewed apps tend to use various terms for describing low and high-level goals, respectively. Such terms, however are introduced with limited definitions and even the distinction between low and high-level goals is limitedly explained. This is problematic for setting user-defined goals at each of these levels. To address this, we suggest consistent terminology for differently capturing high-level goals such as roles, identities, values, as well as low-level goals such as tasks, habits or checklists.

5.4 Structure Visualization

While all apps support users to set multiple goals we have found surprisingly limited support for organizing such goals. In fact, each

goal appears to be pursued and tracked separately, as a set of independent sole goals. However, when we applied Maslow's hierarchy to the goal domains provided by the apps, clusters of goals emerged. Indeed, much research on goal taxonomies suggests that they are not independent but organized in structures. The only structure that the apps support is the relationship between high-level goals and their means. We suggest the value of better supporting users to work with their goal structure. This can open up design opportunities for visualizing such goal structures by integrating, for instance, all active goals across various domains or under the different levels of Maslow's hierarchy, according to which lower-level needs are to be satisfied, for higher-level needs to determine behavior [44].

5.5 Social Support

Findings indicate that while one third of the apps allowed for the setting of social goals, none were shared goals. In addition, social support for both individual and shared goals was limited. This is surprising given the emphasis on the value of social support for behavior change, for instance through social comparison, competition, or social learning [51] [4]. However, while social support has been found to positively influence engagement [45], social comparison appears to be less effective for behavior change, due to limited social connection like the one associated with one's ranking on leaderboard [10]. In light of our findings, we suggest that social support, especially collaborative rather than competitive, can be better supported by apps that address specific goal domains and even more so for collaborative goals that are shared by a dyad or group of people [11].

6 CONCLUSION

Examining the functionalities of the 21 most popular apps on Google Play Store that target goals, our study found that these apps only partially implement the functionalities from theory. Findings indicated three main functionalities for goal capturing, goal monitoring and maintaining motivation highlighting the importance of distinguishing high and low-level goals and their domains, especially since many of these apps support multiple rather than individual goals. We conclude with design implications for supporting user-defined goals across multiple domains, particularly high-level goals, using consistent terms for goals at different levels, visualizing the relationships among multiple goals, and providing collaborative social support.

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