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ORIGINAL PAPER

The impact of an ACT intervention on intrinsic and extrinsic values and life fulfillment: an exploratory randomized controlled trial with university students

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Abstract

Self-Determination Theory's (SDT) perspective on values (intrinsic vs. extrinsic in nature) is useful to help understand and promote psychological well-being, but little is known about how to induce change in these values. Interestingly, though values are at the core of efficacious Acceptance and Commitment Therapy (ACT) interventions, the content of participants' values has not been examined. Integrating basic value research anchored in SDT, we assessed the impact of an ACT intervention, Korsa, on university students' intrinsic and extrinsic values. We also examined whether the importance they ascribed to these values after the intervention could mediate Korsa's impact on life fulfillment. Participants (N=137) were randomly assigned to this 5-session intervention or a waitlist and completed pre-and post-test questionnaires. The results of this randomized controlled trial (RCT) revealed that Korsa led to decreases in extrinsic values' importance, as well as to increases in life fulfillment. However, there was no significant impact on intrinsic values, possibly due to a ceiling effect. Further, path analyses offered limited evidence that post-intervention values mediated Korsa's impact on life fulfillment. In addition to advancing knowledge about how extrinsic values can be changed and well-being improved, this RCT sheds light on new potential mechanisms of action at play in ACT. Replication seems warranted, particularly with more heterogeneous samples.

Keywords Self-determination theory · Intrinsic and extrinsic values · Goal contents theory · Acceptance and commitment therapy · Life fulfillment · Randomized controlled trial · University students

Introduction

Values are important as they guide individuals' daily attitudes, emotions, and behaviours (Kasser, 2002), providing direction for actions (Hayes et al., 2012). They can serve as a compass as they represent enduring beliefs that "a specific mode of conduct or end state of existence is personally or socially preferable to an opposite or converse one" (Rokeach, 1973, p. 5). Numerous researchers agree that values considerably influence psychological well-being, especially its eudemonic aspect which centers around self-realization and experiencing life as full and meaningful (Deci & Ryan, 2000; Kasser & Ryan, 2001; Ryff, 1989). Yet, value change and its link with wellness remains a relatively neglected topic in scientific documentation (Bardi et al., 2009). With this exploratory randomized controlled trial (RCT), we sought to contribute to this literature by building bridges between two research frameworks that address values, but that have evolved independently thus far: Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2017) and Acceptance and Commitment Therapy (ACT; Hayes et al., 2012; Hayes et al., 1999). We assessed whether Korsa, a 5-week ACT group intervention for post-secondary students can influence their values, as they are conceptualized in SDT. In addition to expanding the SDT literature on values with a value-related intervention,

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integrating the SDT perspective into an ACT trial can help explain how it improves well-being.

Types of values in self-determination theory

SDT is a macrotheory of human motivation, development, and health (SDT; Deci & Ryan, 1985, 2000; Ryan & Deci, 2017) based on the basic psychological needs of relatedness, competence, and autonomy. A wealth of studies have supported its claims: social contexts that satisfy these needs lead to well-being, whereas need frustration is conducive to ill-being (Chen et al., 2015; Ryan & Deci, 2017; Ryan et al., 2022; Slemp et al., 2024). In the nineties, innovative studies suggested people should "be careful what they wished for" (Kasser & Ryan, 1993, 1996, 2001; Ryan et al., 1996). That is, goals based on intrinsic values such as intimacy in relationships, personal growth, and community contribution are thought to be coherent with the inherent human tendency towards self-actualization (Kasser, 2002) and foster well-being by inherently satisfying basic psychological needs (Kasser & Ryan, 1993). Conversely, goals based on extrinsic values such as social recognition, financial success, and image are pursued as a means to an end (e.g., rewards or recognition and depend on the contingent reaction of others (Kasser et al., 2002, 2004) and may detract attention from intrinsic values. A vast body of research has supported the distinction between intrinsic and extrinsic values (Kasser & Ryan, 1996; Kim et al., 2003; Ryan et al., 1999; Schmuck et al., 2000), including Grouzet and colleagues' study (2005) conducted in fifteen different countries. In a recent meta-analysis (Bradshaw et al., 2023), 1808 effects derived from 105 (correlational) studies show that while intrinsic values related positively to well-being indicators, extrinsic values are unrelated to wellness, supporting SDT's mini-theory called *goal contents theory* (GCT; Ryan & Deci, 2017; Vansteenkiste et al., 2010).

Kasser (2002) pointed out that people who prioritize intrinsic values will not necessarily consider extrinsic values as bad per se, but rather as less important within their personal value hierarchy. This concept of "centrality" refers to the idea that some values are prioritized over others (Rokeach, 1973). A large number of SDT (correlational) studies used a "relative" aggregated index (e.g., derived from subtracting the average importance of one type of value from the importance of the other type) and found that when extrinsic values predominate, it is linked to less well-being and more ill-being (Bradshaw et al., 2023). However, the validity of such measures has been questioned on some conceptual and statistical grounds (Bradshaw et al., 2023; Tessier et al., 2021; Van Den Broeck et al., 2019; Zuckerman et al., 2002). Notably, using a single, difference score prevents ascertaining how another variable (e.g., an intervention; well-being) is uniquely associated with its constituents. For instance, well-being could be associated with intrinsic values, extrinsic ones, or both. Some authors recommend examining intrinsic and extrinsic values separately to disentangle their respective associations with other constructs (e.g., Tessier et al., 2021).

Interestingly, some repeated-measures studies found that there are some increases in intrinsic values and some decreases in extrinsic values over time, compared to prior rating (Sheldon et al., 2003; (Hope et al., 2014; Niemiec et al., 2009; Sheldon, 2005; Sheldon & Kasser, 2001). This has sometimes been interpreted as congruent with Roger's "organismic valuing process" (1964), which posits that under supportive environmental conditions, humans are naturally inclined to choose values that are likely to support their well-being. It is unclear, however, how age, life experiences, and simply reflecting on values help individuals discern and select "healthier" pursuits.

Intrinsic and extrinsic value changes

Unfortunately, studies associating intrinsic/extrinsic values with psychological well- and ill-being are almost entirely correlational (Bradshaw et al., 2023). Among the rare existing experimental studies, a series of lab experiments found that brief exposure to nature (nature vs. urban slides; plants present or absent) led to increases in intrinsic goals and decreases in extrinsic ones (Weinstein et al., 2009). Few researchers evaluated whether a change in intrinsic and/or extrinsic values could be induced by short interventions. In a randomized experiment on materialism (akin to one type of extrinsic values), Kasser et al. (2014) found that a 3-session program for adolescent-parent dyads about "sharing, saving, and spending" was effective in reducing adolescents' materialistic aims.

Focusing on intrinsic and extrinsic values specifically, Lekes et al. (2012) assessed the impact of reflecting on intrinsic values on university students' values and well-being. In the 4-week experimental condition, participants were first asked to read about the distinction between intrinsic and extrinsic pursuits and their differential links with well-being. They were then invited to write a short text about the two personal intrinsic values they cherished the most and, each week for 4 weeks, to reflect on these intrinsic values. For their part, participants assigned to the active control condition were asked to do similar writing/reflecting exercises, but about ordinary life details (e.g., daily routine, activities). At the end of the intervention, the more deeply participants in the experimental condition reflected on their intrinsic values, the more they prioritized intrinsic values over extrinsic values, and the more elevated their well-being

was, whereas their control counterparts did not show any improvement.

Given that values can change in response to relatively short exercises, it seems plausible that the importance attached to intrinsic and extrinsic values could be modified by therapeutic interventions. In the present RCT, we explored whether a therapeutic intervention helping people reconnect with their values may lead participants to see their intrinsic values as more important and their extrinsic values as less important. Such effects seem likely considering the aforementioned positive bias toward favoring intrinsic values over extrinsic values observed when people are encouraged to reflect on their values (Lekes et al., 2012; Sheldon et al., 2003).

Acceptance and commitment therapy

ACT is a "third wave"[1] cognitive-behavioural therapy (CBT; Hayes et al., 2006; Hayes et al., 1999, 2012) that aims to help individuals engage in value-based behaviours, regardless of the presence or absence of distressing symptoms, to live a meaningful life (Levin et al., 2014). Meta-analyses of many RCTs revealed that ACT interventions outperform control conditions (i.e., treatment as usual, placebo, or waitlist) on well-being indicators such as life satisfaction (Ruiz Jiménez, 2012; Stenhoff et al., 2020) as well as valued and engaged living (Prudenzi et al., 2022; Trompetter et al., 2015). Even though reducing symptoms is not the primary target, ACT is more efficacious than control conditions (i.e., treatment as usual, placebo, or waitlist) and may be as effective as established psychological interventions in treating chronic pain, anxiety disorders, depression, and addictions (A-Tjak et al., 2015; Bai et al., 2020; Coto-Lesmes et al., 2020; Gloster et al., 2020; Powers et al., 2009).

According to ACT's theoretical model, greater psychological flexibility is what fosters psychological well-being. Clarifying one's deepest values (i.e., what truly motivates and matters) and engaging in "committed actions" (i.e., taking actions guided by values; Hayes et al., 2012) are two of the six processes by which psychological flexibility is said to be developed. Together, they are referred to as "valued living" (Barrett et al., 2019) and hold a special place in ACT since the main goal of this therapy is to help people create a value-congruent life or, in other terms, a meaningful life (Harris, 2009).

Surprisingly, limited ACT research has pertained to values and committed actions, compared to the other psychological flexibility processes (i.e., accepting, mindful, observing, and "defusion" stance). Authors of some reviews (Reilly et al., 2019; Stockton et al., 2019) posit that more evaluations of value-related changes are needed within ACT research, given the central role of values in this therapeutic approach. Moreover, after reviewing mediators at play in ACT, some researchers suggested that mechanisms other than psychological flexibility may foster psychological improvements (Arch et al., 2023). For instance, in a narrative review, Hayes and colleagues (2011) reported that about 50% of between-condition differences in well-being outcomes could be explained by psychological flexibility or some of its components, leaving half of the variance unexplained. There is thus a need for additional studies seeking to identify the processes through which ACT interventions promote well-being (Howell & Passmore, 2019; Stenhoff et al., 2020), as such knowledge would in turn guide potential improvements in ACT interventions.

ACT emphasizes commitment to one's values (akin to self-concordant goals; Sheldon, 2014) *regardless* of their type. Indeed, within the ACT framework, the content of values is generally not defined. The distinction between intrinsic and extrinsic values is not made explicit since ACT is not about teaching participants any particular set of morals or "correct" values (Luoma et al., 2007). That being said, it can also be argued that there is an *implicit* orientation toward intrinsic values in ACT given that participants are encouraged to "explore meaning and purpose, search for what is intrinsically reinforcing […] and find life directions that resonate with their deepest longings" (Luoma et al., 2007, p. 267). Yet, according to SDT, it is not only the degree of commitment to one's values that contributes to individuals' wellness but also whether pursued values are intrinsic or extrinsic in nature.

Korsa

Over the past years, ACT programs have been developed and delivered in some postsecondary institutions to foster students' psychological health and well-being (Danitz & Orsillo, 2014; Levin et al., 2014; Räsänen et al., 2016). In the province of Québec (Canada), Grégoire et al. (2016, 2018) developed a program called *Korsa* (meaning "to cross over", in Swedish). Based on ACT's classical writings (DuFrene & Wilson, 2010; Harris, 2009; Hayes et al., 2012; Polk & Schoendorff, 2014), all of its elements of content are based on ACT's psychological flexibility model. For instance, the values and committed actions processes are fostered by

[1] Contrary to the earlier "outcome-oriented" cognitive-behavioural therapies (CBT), third-wave CBT are more process- vs. outcome-oriented (Ryan, 2021) and include psychological constructs congruent with SDT principles such as mindfulness, integrative (vs. suppressive) emotion regulation, and identified motivation.Contrary to the earlier "outcome-oriented" cognitive-behavioural therapies (CBT), third-wave CBT are more process- vs. outcome-oriented (Ryan, 2021) and include psychological constructs congruent with SDT principles such as mindfulness, integrative (vs. suppressive) emotion regulation, and identified motivation.

activities inviting students to (a) reflect on what is important to them in their studies, and (b) take concrete action to live in harmony with these values. Thus far, results of two RCTs showed that this ACT intervention helps reduce university students' anxiety, depression, and stress, as well as increase their psychological well-being, the latter assessed with an index aggregating various constructs (e.g., self-esteem, happiness, social involvement, sense of control; (Grégoire et al., 2016, 2018; Massé et al., 1998).

The present study

Associations between values (intrinsic vs. extrinsic) and psychological well- and ill-being have been replicated in many correlation studies but no causal inferences can be drawn from such designs. Moreover, longitudinal studies on this topic are rare and can only suggest direction. To advance knowledge on the causal role of intrinsic/extrinsic values on well-being, we conducted an RCT to test (a) whether these values can be changed by an ACT intervention (Korsa) and (b) whether such changes are associated with well-being improvement (i.e., greater life fulfillment). Building bridges between fundamental SDT value research and applied ACT research, we hypothesized that after being offered Korsa, students would (H1) ascribe more importance to intrinsic values and less importance to extrinsic values and (H2) report greater life fulfillment, but also, compared to participants on a waitlist. Given that intrinsic values are linked to numerous well-being outcomes while favoring extrinsic over intrinsic ones is negatively linked with such benefits, we also hypothesized that (H3) Korsa would indirectly foster life fulfillment through its effects on intrinsic values and extrinsic values.

Method

Participants

The present study is part of a larger Korsa trial, conducted in a Canadian university (Université du Québec à Montréal; UQÀM). A total of 137 university students participated in the present study, aged 19 to 53 years (M=30.2 years old, Mdn=28.0, SD=8.1). Most of them were women (82.8%) and full-time students (77.3%), either in a master's (42.7%), bachelor's (36.6%) or doctoral degree program (20.6%). About a third (30%) of participants were studying in education or social sciences. More than half of the participants (61.3%) were born in Canada. Others were born in Europe (19.0%), South America (9.5%), Africa (6.6%), or other regions of the world (3.6%). To be included in the study, participants had to speak French.

Procedure

The research was approved by the research ethics committee of the authors' university. The program was offered free of charge, and participation in the study was voluntary. First, the Korsa program was advertised through the UQÀM website, posters located around its campus, and emails sent to students. Students could then express their interest in this program by registering on the Korsa website. Registered students were informed that a Korsa group would take place in 2 weeks and another one in 2 months, and that for research purposes, they had to be randomly assigned to one of these time slots (i.e., they could not choose when to take part).

Next, recruitment for the study was made among these registered students by sending them an email inviting them to take part in a study assessing Korsa. Students who manifested an interest in the study were then sent an email comprising a link to access the online consent form, preceding the first questionnaire. It was made clear that the program participation was independent of study involvement. That is, students were still offered the Korsa program at their assigned time slot if they declined to participate in its evaluation.

Participants in the experimental condition started the program one week after receiving the consent form and baseline (T1) questionnaire. The post-intervention (T2) questionnaire was completed by all participants, including those in the waitlist condition, on week 6 (i.e., the evening after students in the experimental condition were delivered their last session; see Table 1). Two weeks later, Korsa was offered to participants on the waitlist. As a compensation for their participation in the study, students received a 5$ gift certificate (choice between a general store, a fast-food restaurant, or a bookstore) after completing each questionnaire.

Intervention (Korsa)

Korsa (Grégoire et al., 2016, 2018) was presented to students as a way to go through their studies successfully while maintaining a good quality of life and deal with their stress. It comprises five in-person group sessions of 2.5 h, offered to groups of 8 to 15 students on consecutive weeks. These sessions consist mostly of contemplative and experiential exercises (e.g., meditation; visualization) aimed to help participants accept their difficult experiences, clarify what is important to them, and translate their values into concrete goals and actions (see Table 2). For example, in the "Already 80!" exercise, participants imagine they are celebrating their 80th birthday (Harris, 2009). They are invited to envision what family or friends would say about their qualities, the role they played in their lives, or the causes

Table 1 Research design

	T1	T2											
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13
Experimental condition	Q	S1	S2	S3	S4	S5 Q							
Waitlist control condition	Q					Q			S1	S2	S3	S4	S5

T1 pre-intervention, *T2* post-intervention, *W* week, *S* Korsa session, *Q* questionnaire

Table 2 Some of Korsa goals, components, exercises, and metaphors

Session	Objectives	Exercises and metaphors
Session 1	Discuss group operating standards. Allow students to verbalize their expectations. Discuss stress and its various manifestations. Discuss session's objectives. Create a climate of security in which students will feel comfortable sharing.	Dyad and group discussions
Session 2	Help students to deliberately focus their attention on their experience (internal and external), as it unfolds in the present moment, without judgment. Help students recognize the tendency to develop many strategies to control or avoid thoughts, emotions and feelings.	Body scan (Segal et al., 2002) The ACT Matrix (Polk & Schoendorff, 2014)
Session 3	Encourage students to clarify their values but also set goals and take actions consistent with them. Help students become more aware of their relationship with their thoughts (i.e., cognitive fusion).	Exercise "Already 80!" (Harris, 2009) Guided visualization of values
Session 4	Encourage students to accept rather than control the painful thoughts and emotions they are struggling with and reduce experiential avoidance behaviours. Help them distance themselves from these painful thoughts and emotions without trying to change, control or avoid them.	"Holding a Pen" exercise (Stoddard & Afari, 2014) "Two sheets of paper" exercise (Flaxman et al., 2013)
Session 5	Review learnings made during the previous sessions.	Dyad and group discussions

they advocated. Sessions also comprise explicit teaching (e.g., the distinction between goals and values), metaphors (e.g., life compass), guided discussions, and behavioral activation strategies (e.g., key ring as a memory aid for committed actions). Participants are also encouraged to complete exercises between sessions (e.g., self-observation grid about thoughts, emotions or sensations arising during difficult situations; audio-guided meditations).

All Korsa sessions were led by dyads of co-facilitators. All were trained in counselling (i.e., doctoral psychology students, psychologists, or guidance counselors) and were blind to the study's hypotheses. They also attended a mandatory 4-day training session, which covered Korsa's content as well as the importance of adopting an open and non-judgmental attitude. When facilitating groups, they used the manualized facilitators' guide, designed to standardize the session by providing a detailed description of each session (e.g., how exercises should be presented, how long each should last, and what themes to highlight).

Measures

Outcome variables were measured prior to randomization (pre-intervention; T1) and the night after the lest session was delivered to participants in the experimental condition (post-intervention; T2). Socio-demographic information was gathered solely at T1.

Intrinsic and extrinsic values

The French version of the Aspiration Index was used to assess the importance ascribed to intrinsic values and extrinsic values (Kasser & Ryan, 1996; Tessier et al., 2021). The Aspiration Index is a 30-item self-report inventory. Its instructions read: "Everyone has long-term goals or aspirations. These are the things that individuals hope to accomplish over the course of their lives. In this section, you will find a number of life goals, presented one at a time. Please indicate, *how important is this goal to you*?" Participants rated the importance that each goal had for them, on a 7-point scale, ranging from 1 (*Not at all*) to 7 (*Very much*). The AI has three extrinsic values subscales and three intrinsic values subscales (five items each): the extrinsic values of Financial Success (e.g., "To have many expensive possessions"), Social Recognition (e.g., "To have my name known by many people"), and Image (e.g., "To achieve the 'look' I have been after"), as well as the intrinsic values of Intimacy in Relationships (e.g., "To have good friends that I can count on"), Community Contribution (e.g., "To assist people who need it, asking nothing in return") and Personal Growth (e.g., "To gain increasing insight into why I do the things I do"). Good internal reliabilities were obtained for both the intrinsic (α T1/T2 = 0.83/0.85) and extrinsic subscales (α T1/T2 = 0.91/0.92) in the present study.

Life fulfillment

To assess participants' life fulfillment, we used the French version of the Life Fulfilment subscale of the Engaged Living Scale, a well-known ACT instrument (Grégoire et al., 2021; Trompetter et al., 2013). It is used to assess participants' sense of life fulfillment derived from recognizing and living in accordance with their personal values and can thus be seen to assess a facet of eudemonic well-being (Ryan & Deci, 2001). Participants were invited to rate their agreement with six items, rated on a scale from 1 to 5 ("*Completely disagree"* to *"Completely agree*"). Example are "I feel that I am living a full life", "I live the way I always intended to live", and "Nothing can stop me from doing something that's important to me." This measure demonstrated a good internal reliability in this sample (α T1/T2 = 0.85/0.89).

Plan of analyses

Preliminary analyses

As preliminary analyses, we first documented (1) participation rate in the experimental Korsa condition, (2) attrition rates, and (3) missing data on the variables of interest. We then (4) imputed missing data using the expectation-maximization algorithm with the maximum likelihood estimator in 20 datasets. Using an aggregation of the 20 imputed datasets, we (5) performed a series of two MANOVAs to examine pre-intervention differences within participants in the experimental condition and compared participants of both conditions. In the first MANOVA, we (5.1) tested whether students in the experimental condition who took part in all of Korsa's sessions differed from those who did not on our sociodemographic variables and our outcome measures at T1 (extrinsic values, intrinsic values, and life fulfillment). In the second MANOVA, we (5.2) examined whether participants in the experimental condition differed from those in the control condition on those same variables (randomization check). Finally, we examined (6) the descriptive statistics (see Table 3) and correlations among our variables of interest and our sociodemographic variables (see Table 4).

Main analyses

For our main analyses, we performed a series of two path analyses with the maximum likelihood (ML) estimator on the R 4.4.2 software, this time using Full Information Maximum Likelihood (FIML) to handle missing data. All main analyses were conducted (1) controlling for T1 levels of all the dependent variables simultaneously (i.e., intrinsic values, extrinsic values and life fulfillment) to statistically ensure equivalence between conditions on these key variables (Loh & Ren, 2023), and (2) using an intent-to-treat

Table 3 Means and standard deviations of the study's main variables within each condition

Variables (theoretical min-max)	Experimental condition				Waitlist control condition			
	T1		T2		T1		T2	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)
Intrinsic values (1 to 7)	6.19	(0.57)	6.29	(0.54)	6.05	(0.59)	6.09	(0.62)
Extrinsic values (1 to 7)	3.12	(1.10)	3.01	(1.04)	3.18	(1.01)	3.25	(1.05)
Life fulfillment (1 to 5)	2.83	(0.75)	3.11	(0.78)	2.89	(0.72)	2.85	(0.80)

T1 pre-intervention, *T2* post-intervention, *M* Mean, *SD* standard deviation

Table 4 Correlations among all main variables

	1	2	3	4	5	6	7
1. Intrinsic values (T1)							
2. Extrinsic values (T1)	0.23**						
3. Life fulfillment (T1)	−0.02	−0.30***					
4. Intrinsic values (T2)	0.82***	0.22**	−0.10				
5. Extrinsic values (T2)	0.19*	0.91***	−0.37***	0.24**			
6. Life fulfillment (T2)	0.22**	0.07	0.66***	0.16	−0.19*		
7. Age	−0.00	−0.04	−0.02	−0.01	−0.05	0.07	
8. Gender	−0.05	0.03	−0.14	−0.00	0.09	−0.16	0.15

T1 pe-intervention, *T2* post-intervention, *Gender*: 0 = women; 1 = men

*p <.05, **p <.01, *** p <.001

strategy, a stringent approach which preserves the comparability of conditions allowed by randomization and includes all participants, regardless of their attendance (McCoy, 2017; Newell, 1992).

In the first path analysis, we simultaneously assessed the direct effects of our conditions (i.e., Korsa vs. waitlist) on participants' intrinsic values, extrinsic values, and life fulfillment at T2. To ensure adequate statistical power to detect the effect of our condition on each DV, a sample size ranging between 100 and 200 participants is recommended (Kline, 2023). In the second path analysis, we tested whether the importance ascribed to intrinsic and extrinsic values mediated Korsa's impact on life fulfillment. To determine whether our data were better adjusted to a partial mediational model (where the direct link between our condition variable and life fulfillment is modelled) or to a full mediational model (where the direct link is fixed at 0), we used the Bayesian information criterion (BIC; Raftery, 1995). We then examined the model fit of the retained model and reported all relevant direct and indirect effects. To ensure adequate statistical power for our path analysis, a sample size ranging between 200 and 400 participants is recommended (Kline, 2023).

Secondary analyses

Finally, we performed secondary analyses to explore the possibility that participants' attendance rate (number of sessions) influenced the magnitude of change in our outcomes variables from T1 to T2. Still using FIML to handle missing data, we conducted a path analysis in which we modelled attendance rate as our independent variable, all post-intervention outcomes as our dependent variables, and all baseline levels of our outcomes as covariates. Provided a significant relation between attendance rate and T2 outcomes, we intended to conduct a multi-group path analysis to assess the direct effects of the manipulation (i.e., Korsa vs. waitlist) on participants' intrinsic values, extrinsic values, and life fulfillment at T2 separately for (1) participants who took part in at least three sessions and (2) those who took part in less than three sessions. To ensure adequate statistical power for this path analysis, a sample size ranging between 100 and 200 participants is recommended (Kline, 2023).

Results

Preliminary analyses

Attendance rate

Among the 64 participants assigned to the experimental Korsa condition, 39% attended at least four of the five sessions while 19% attended two or three of them. Almost a third attended very little or no session, as 17% participated in only one session and 15% did not attend any of them.

Attrition rates

Among the 137 participants, 25 of them (i.e., 22%) did not fill out the T2 questionnaire. Examining the attrition rate within each condition revealed that more than a third (35%) of participants in the experimental condition did not complete this T2 questionnaire, whereas 11% of participants on the waitlist did not do so (see Fig. 1 for more information).

Missing data

On average, 10.7% of the data or less was missing per variable across time points (Minimum = 0.0%; Maximum = 24.5%). Little's MCAR test based on the normed chi-square suggested that data could be missing completely at random, $NC = 1.6$ (Ullman, 2001). This confirmed our choice to impute missing data for the preliminary analyses and FIML for our main analyses (see plan of analyses).

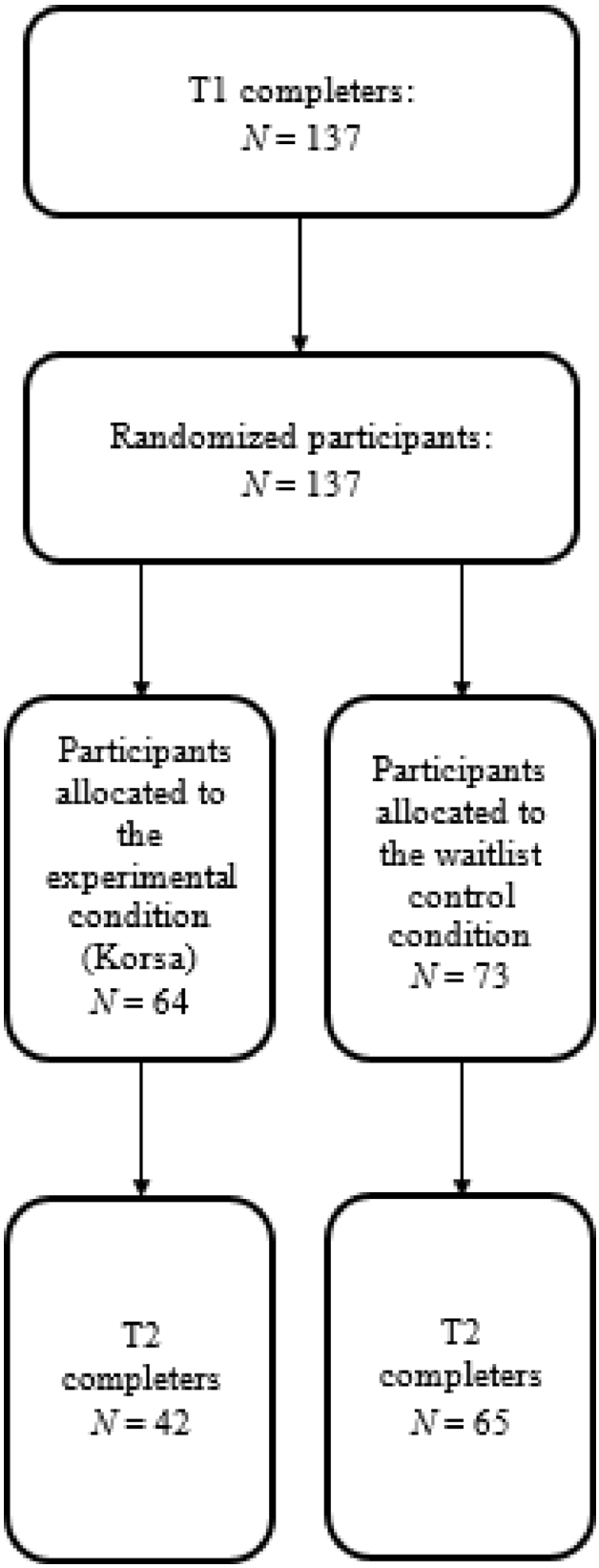

Fig. 1 Flow chart of participants in the randomized controlled trial

Table 5 Korsa's effects on intrinsic values, extrinsic values, and life fulfillment at T2, controlling for T1

Independent variable and covariates	Intrinsic values (T2)	Extrinsic values (T2)	Life fulfillment (T2)
	ß (SE)		
Condition	0.07 (0.06)	−0.11 (0.04)*	0.15 (0.07)*
Intrinsic values (T1)	0.77 (0.04)*	−0.00 (0.04)	0.15 (0.07)*
Extrinsic values (T1)	0.02 (0.06)	0.87 (0.03)*	0.11 (0.07)
Life fulfillment (T1)	−0.07 (0.06)	−0.10 (0.04)*	0.69 (0.06)*

Condition: 0 = waitlist control; 1 = Korsa, *T1* pre-intervention, *T2* = Post-intervention; *β* = Standardized beta coefficients, *SE* standard error

*$p < .05$

Pre-intervention differences

Conducting MANOVAs with our imputed dataset to examine T1 differences first revealed that among participants assigned to Korsa, those who completed it did not differ from those who dropped out on key sociodemographic variables nor on any T1 levels of outcome measures (i.e., intrinsic values, extrinsic values, and life fulfillment; $p = .50$). Next, a second series of MANOVAs revealed that participants in the experimental condition did not differ from those in the waitlist condition on these same variables ($p = .612$), suggesting a successful randomization.

Descriptive statistics and correlational analyses

The means and standard deviations of all variables of interest after imputation are shown in Table 3, while Table 4 presents the bivariate correlations between the study's main variables. Within each time point, life fulfillment was negatively related to extrinsic values but, unexpectedly, it was not significantly related to intrinsic values ($ps \geq 0.06$). Similar to prior studies (Bradshaw et al., 2023), intrinsic values and extrinsic values were positively correlated across time points. Finally, participants' age and gender were unrelated to any variables (and as such were not included in our main analyses).

Main analyses

Table 5 presents the standardized beta coefficients and effect sizes of the main analyses. Path analysis showed that (H1) after controlling for all T1 levels, participants assigned to Korsa reported significantly lower extrinsic values at T2, compared to participants on the waitlist. However, this intervention did not have a significant effect on participants' intrinsic values ($p = .24$). Regarding life fulfillment (H2), Korsa had a significant positive impact, with students in the

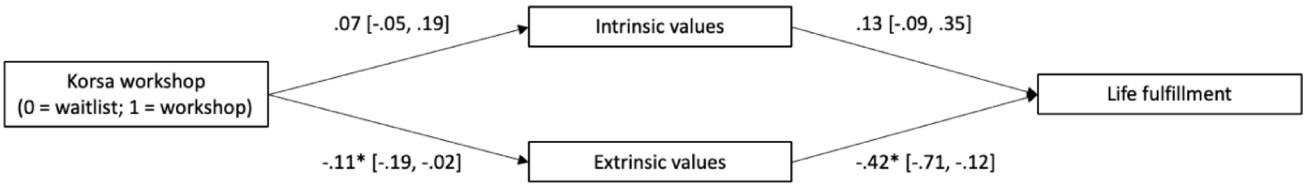

Fig. 2 Korsa's indirect effects on life fulfillment via extrinsic and intrinsic values. The relations between covariates (i.e., pre-intervention levels of intrinsic values, extrinsic values and life fulfillment) and all other variables are modeled, but not depicted for parsimony purposes. Numbers represent standardized beta coefficients [95% confidence intervals]. *p <.05. Indirect effects of Korsa on Life fulfillment, via extrinsic values: β =.05 [-.002,.092], p =.07. Indirect effect of Korsa on Life Fulfillment, via Intrinsic Values: ß =.01 [-.013,.030], p =.41

experimental condition reporting higher life fulfillment at T2, compared to students on the waitlist.

We then explored the potentially mediating role of participants' values in the effect of Korsa participants' life fulfillment (H3). Using the BIC, we found evidence that the data were better adjusted to a full mediational model (BIC = 502.82), compared to a partial mediation model (BIC = 505.48; Raftery, 1995). Following best practice recommendations, specifically the parsimony principle (Kline, 2023), we retained the full mediational model, which had an acceptable fit, CFI > 0.99, TLI = 0.96, RMSEA = 0.10 (close fit RMSEA ≥ 0.05, p =.211), SRMR = 0.02. As depicted in Fig. 2, results showed that after adjusting for T1 levels of the main variables, being offered Korsa (vs. being on the waitlist) predicted significantly lower extrinsic values importance at T2, p =.01. Lower extrinsic values importance at T2 in turn predicted higher life fulfillment at T2, p =.01. Examining indirect effects offered inconsistent evidence that this ACT intervention impacted life fulfillment, via extrinsic values, ß = 0.05, as only a non-significant trend was observed, p =.07. Finally, we observed no effect of Korsa on intrinsic values, nor any link between intrinsic values and life fulfillment, ps ≥ 0.24.

Secondary analyses

Exploring the possibility that participants' attendance rate (number of Korsa sessions) influenced the magnitude of change in outcomes variables from T1 to T2 revealed limited effects. Indeed, Korsa participants' attendance rate did not predict their T2 scores on any outcome variable after adjusting for their T1 scores, all ps ≥ 0.42.

Supplemental analyses

To provide complementary, concrete, and meaningful information, we compared the rate of participants who increased (from pre to post-intervention) in life fulfillment, using the same imputed dataset as in our preliminary analyses. In the experimental Korsa condition, 54.79% showed an increase, compared to 35.94% in the waitlist condition, $\chi 2$ (1) = 4.88, p =.027.

Discussion

GCT research showing that extrinsic and intrinsic values relate differently to well-being is, unfortunately, mostly correlational (Bradshaw et al., 2023), and to date, the few experiments aiming to induce change in GCT values did not look into therapeutic interventions (e.g., Kasser et al., 2014; Weinstein et al., 2009; Lekes et al., 2012). In the present experiment, we tested whether being encouraged and guided to clarify and follow personal values could induce change in these values, and whether this could contribute to fostering life fulfillment. The present waitlist RCT suggests that Korsa, an ACT intervention, can induce change in university students' extrinsic values and foster their life fulfillment, even though it does not teach about GCT (i.e., goals based on intrinsic vs. extrinsic values, and their differential links with well- and ill-being). This study also provides preliminary insights on the potential mediating role of participants' values in the intervention's effects on life fulfillment. Though these findings await replication, they can be seen as contributing to expanding SDT literature by incorporating an ACT intervention as an independent variable in an experimental study, in addition to helping expand the ACT literature by integrating SDT variables as potential mechanisms of change.

Korsa's impact on intrinsic and extrinsic values (H1)

After the intervention, participants in the experimental condition rated extrinsic values as less important than participants on the waitlist. Even though Korsa never addressed the specific content of participants' values, students in this condition seemed to place less importance on extrinsic values such as wealth, fame or image after the intervention, when compared to participants on the waitlist. In contrast, there was no between-condition difference in the rated importance of intrinsic values. Compared to extrinsic values, intrinsic ones may be more stable or less susceptible to change due to experiences (Sheldon, 2005). Another and more probable reason is related to the initially elevated levels of importance placed on intrinsic values, which may have prevented substantial increases. This potential ceiling

effect also limits variability, which in turn could have prevented the detection of significant associations with life fulfillment in this sample. Consistently, intrinsic values were not related to life fulfillment, both in our correlational and main analyses.

The hypothesized increase in intrinsic values' importance could perhaps be observed within a more diverse and/or less intrinsic values-oriented sample. Compared to the mean levels of intrinsic values found in other studies, the present average is higher (i.e., 6.19 vs. 3.89 to 5.63; Sheldon & Krieger, 2004, 2014; Tessier et al., 2021; Van Den Broeck et al., 2019). This may be related to the fact that Korsa was described as targeting quality of life, possibly responsible for a selection bias favouring students with an orientation towards personal growth, which is an intrinsic aspiration. The high rate of participants studying social sciences or education is another probable related cause. Social desirability is another possible explanation. Participants may have rated intrinsic values as more important because personal growth, community contribution or intimacy in relationships may be viewed as more socially desirable than image, wealth or fame. It would have been preferable to control for social desirability in this study, a variable that may bias value ratings (Schwartz & Bilsky, 1987; Lekes et al., 2012).

Nevertheless, the present results suggest that it is possible to influence university students' values with an intervention that encourages them to reflect on what truly matters in their lives and to engage in coherent, value-based behaviors. Korsa does not teach about GCT nor does it refer to any particular type of values, or recommends avoiding putting certain values into practice. By inviting its participants to "reconnect with what is important", this ACT intervention may have implicitly (Luoma et al., 2007) oriented its participants to healthier goals, from the SDT perspective. Korsa may have facilitated the natural self-actualizing process that leads participants to shift away from values that do not promote their wellness. Reflecting on what is important in their lives and behaving accordingly probably both helped participants realize that what matters the most to them does not correspond to what GCT calls extrinsic values. The unique contribution of clarifying and engaging in values could not be estimated in this study.

Korsa's life fulfillment benefits (H2)

Consistent with our expectations, a positive impact of Korsa on life fulfillment, a eudemonic well-being indicator, was found in this sample. Compared to students on the waitlist, those who were offered Korsa were more likely to report living a full life and engaging in important things. These results extend previous evidence showing that Korsa led to an aggregated measure of well-being (Grégoire et al., 2016, 2018) among university students. Given that this population tends to report high levels of psychological distress (American College Health Association, 2022), making Korsa available on campuses could represent an inclusive, non-stigmatizing, and efficacious strategy to address this serious health concern. Indeed, even when benefits are of small size, at the individual level, they can be meaningful at a population level. Universal prevention programs indeed aim to shift the entire population distribution toward lower problems (Rose et al., 2008).

Mediating effects (H3)

Overall, we found somewhat limited support for the mediating role of GCT values in Korsa's impact on life fulfillment. Regarding the importance of intrinsic values, the lack of any significant change in participants' intrinsic values after the intervention and the absence of association between intrinsic values and life fulfillment precluded it from acting as a mediator. Once again, the life fulfillment's elevated pre-intervention average and its limited variance may explain these results.

Regarding the importance of extrinsic values, we found partial evidence that they could mediate the effects of this ACT intervention on life fulfillment. Though the data in the present sample were better adjusted to a full mediation model, suggesting that our mediating variables could fully explain the effects of the Korsa workshop on life fulfillment, the indirect effect via extrinsic values was only a non-significant trend. At first glance, this pattern of results may lead one to conclude that GCT values do not play a mediating role. It is indeed possible that other mediators better explain how Korsa promotes life fulfillment, such as psychological flexibility. However, it still seems warranted to further investigate the potential mediating role of values, with larger and more diverse and samples. Thus, future research would help clarify whether ACT interventions not only help people shift away from extrinsic values but also indirectly improve their life fulfillment through such decreases in extrinsic values. The significant impact of this ACT-based intervention on extrinsic values is promising given that values tend to be quite stable and that when change does occur, it usually takes time (Bardi et al., 2009). In any case, a 5-week ACT-based intervention can help students realize that some of their strivings are not as important as they once seemed and future work could help elucidate whether such reappraisals are beneficial for greater life fulfillment. To our knowledge, this is the first study exploring whether the importance placed on GCT values could mediate the effects of a therapeutic intervention on a well-being outcome. Future longitudinal ACT evaluations with larger sample sizes in which both potential mediators and

well-being outcomes are repeatedly assessed will be necessary to test such mediational processes more rigorously.

Strengths, limitations, and future studies

Strengths

This study has several strengths that deserve attention. First, measuring intrinsic and extrinsic values in an ACT trial is innovative. The present study is one of the very few studies building bridges between the ACT and SDT frameworks. Next, due to its experimental design, our study can point to an efficacious way to modify the importance people place on extrinsic values. This helps expand GCT research, moving beyond correlational results. Third, examining the impact of Korsa on values also widens the scope of ACT research, as these outcomes have received relatively little attention in the ACT literature (Reilly et al., 2019; Stockton et al., 2019), especially by adopting the SDT perspective.

Limits and mitigation ideas

Our trial is also limited in certain ways. First, as we did not compare Korsa to another intervention, the extent to which benefits are attributable to its unique content remains unknown. It would have been preferable to use an active rather than a passive control condition to control for non-specific effects (e.g., social support processes). Second, no follow-up other than our post-intervention measurement was included in this study, preventing us from examining (1) whether the observed effects at post-intervention would be maintained over time and/or emerge at a later time, and (2) whether changes in life fulfillment are actually preceded by changes in values. Longitudinal and diary designs with additional time points and conducted over a longer period (e.g., Finkelstein-Fox et al., 2020) would be especially valuable in future trials to explore how variables such as intrinsic values, extrinsic values, and well-being indicators evolve over time and to assess mechanisms of change.

Third, our limited sample sizes induced statistical power issues, especially for our mediational analysis. Future studies with larger sample sizes are thus necessary to better document the effects (or lack thereof) of Korsa on participants' values and wellness. Simulation-based studies suggest that approximately 400 participants are needed to have an 80% chance of detecting small-to-medium indirect effects (Fritz & MacKinnon, 2007). Importantly, recruitment should be made across various faculties and departments (e.g., economics, engineering, physics, law, music) and recruit a larger proportion of men, which could foster greater variance in values and decrease the odds of ceiling effects. Fourth, students' exposure to the intervention was relatively low in the present trial, which may have contributed to an underestimation of its benefits, given our use of the stringent intent-to-treat approach. Although we made sure that Korsa took place before, rather than during, the university exam period, the fourth and fifth sessions probably overlapped with an intensive study period. At such times, university students are likely to have an overloaded schedule and struggle to find a balance between multiple life domains (American College Health Association, 2022; Tremblay & Alberio, 2016). Future trials would do well to avoid pre-exam periods. Finally, it would have been preferable to randomly assign participants after (vs. before) the pre-intervention questionnaire, as this could have jeopardized condition equivalence at T1. Fortunately, randomization was successful in this study.

Surprisingly, the number of Korsa sessions students were exposed to did not modify this intervention's effect (or lack thereof) on any outcomes, suggesting that some minimal participation is sufficient to induce some positive changes. Monitoring which sessions participants missed or not would allow for exploring if being exposed to some content elements moderates the extent to which one benefits from an ACT intervention.

Other future research avenues

There are other worthwhile future research avenues in addition to the ones aiming to avoid some of the present study's limits. One of them is the inclusion of a wider range of well-being and ill-being measures (e.g., vitality, meaning in life; depression, anxiety). Also assessing some prosocial outcomes would be important and innovative, to explore whether value change can have collective benefits in addition to individual ones. For instance, Sheldon et al. (2011) found that college students were more likely to recommend policies about the size of ecological footprints when reminded of intrinsic values.

What leads ACT participants to reduce the importance they ascribe to extrinsic values deserves empirical attention. Korsa might have prompted students to experience discomfort by realizing that certain aspirations did not contribute to their personal growth, motivating them towards reorientation (Carver & Scheier, 2000). However, according to SDT, "merely developing discrepancy […] but without an emphasis on personal choice […] is unlikely to foster the best conditions for long-term persistence and integration of the behavior so that it is consistent with a client's sense of self" (Markland et al., 2005; p. 825).

ACT may do more than remind people of what is more or less important to them. Assessing how much participants tried to make each goal of the Aspiration Index (AI) in addition to their importance ("walking" and "talking" versions;

Sheldon & Krieger, 2014; Tessier et al., 2021b) in future ACT trials could help further elucidate the mechanisms by which ACT can foster change in these values, and on well-being. Perhaps engaging in more "committed actions" is especially important to help participants realize that their extrinsic pursuits are not as inherently satisfying as their intrinsic ones, which could influence the level of importance participants ascribe to each type of value. Exploring the role of basic psychological needs satisfaction and frustration (Chen et al., 2015) would also be informative when further investigating how an ACT intervention leads to value changes.

Concluding remarks

Some existing interventions can inform SDT by providing concrete examples of how SDT principles can be put into practice (e.g., Donald et al., 2020; Joussemet et al., 2018; Mageau et al., 2022; Markland et al., 2005). SDT researchers can borrow methods and practices from other approaches (not necessarily ACT) to design experimental studies and move beyond correlational knowledge. For instance, studies integrating SDT with motivational interviewing (Markland et al., 2005) contributed to the advancement of both theoretical and practical knowledge. Testing whether existing interventions lead to some proximal SDT outcomes (e.g., greater basic psychological needs, intrinsic values, self-determined motivation) and whether the latter explains more distal benefits (i.e., psychological and/or physical health) can help advance toward a "more convergent clinical science" (Ryan, 2021; p. 377).

Assessing the impact of specific exercises or intervention components would be especially informative, as most therapeutic programs and interventions combine many intertwined components, blurring conclusions. For instance, mindfulness training has been found to lead to increased autonomous motivation (see Donald et al., 2020; for a meta-analytic review). Future studies could compare the effects of, for instance, reflecting on values in general "à la ACT" vs. reflecting on IV/EV, "à la GCT" (Lekes et al., 2012) on various mental health outcomes and some potentially mediating variables derived from the ACT and SDT models.

Further research could benefit from integrating SDT and ACT conceptualizations and measures. Should ACT interventions address the distinction between intrinsic and extrinsic values? Do changes in these values' rated importance or "committed actions" to pursue them foster psychological health? We believe these are a few of many fruitful questions that deserve attention in future studies.

Author contributions LMH, MJ, and SG contributed to the study conception and design. LMH performed data collection. Data analysis was performed by LMH and JMR, with other authors contributing to the interpretation of the results. The manuscript was drafted by LMH. All other authors reviewed and commented on previous versions of the manuscript. All authors have read and approved the final manuscript.

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Declarations

Conflict of interest The authors have no conflicts of interest.

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