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Flow Experience and Emotional Well-Being among Italian Adolescents during the COVID-19 Pandemic

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ABSTRACT

Research highlighted the negative consequences of the COVID-19 pandemic on adolescents' emotional well-being worldwide. In the attempt to identify resources which could facilitate adolescents' adjustment, this study examined the occurrence of flow experience and related activities, and the association between flow and emotional well-being among Italian teenagers. In Spring 2021, 150 students (40.7% girls) aged 15–19 completed instruments assessing flow and related activities before and during the pandemic, and current positive and negative affect. Findings revealed that only 24.7% of the participants currently reported flow; over half of those reporting flow before the pandemic did not experience it subsequently, and only 6.5% of those not reporting flow before the pandemic currently experienced it. Participants with flow both before and during the pandemic reported higher positive affect than teens who never experienced flow ($p = .011$), or lost it ($p = .006$). No group differences were detected for negative affect. Learning, structured leisure, and interpersonal relations were the domains most frequently associated with flow before and during the pandemic, but after the pandemic onset a reduction in the variety of flow activities and limited identification of new flow domains were observed. The association of flow with higher emotional well-being even in pandemic times suggests the potential usefulness of interventions promoting flow retrieval under adverse circumstances.

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Introduction

Since its outbreak in 2020, the COVID-19 pandemic has had a great impact on the life styles of the world population, with relevant bio-psycho-social consequences for individual and collective well-being (Banks et al., 2021). Particularly, adolescents have experienced severe restrictions in activities deemed as highly relevant for their physical and psycho-social growth, as a consequence of home confinement, physical distancing, partial or complete school closure, online learning, and limitations to outdoors leisure practice (Commodari & La Rosa, 2020; Jones et al., 2021). Adolescence is a sensitive developmental stage (Arnett, 2016), characterized by significant challenges such as formation of one's identity, discovery of meaningful interests, planning of future objectives, as well as establishment of significant affective bonds. The restrictions

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imposed by the pandemic can prevent adolescents from constructively facing these challenges, and represent potential risk factors for psycho-social maladjustment (Fore, 2020; Orben et al., 2020).

Soon after the pandemic outbreak and subsequent lockdown, teenagers deemed restriction measures as necessary to contain the spread of the virus in the face of perceived health risks (Commodari & La Rosa, 2020; Commodari et al., 2020; Ding et al., 2020). However, the constraints generated several behavioral problems, including relational difficulties with family members, higher screen time and smartphone use (Jester & Kang, 2021; Serra et al., 2021), as well as significant emotional reactions such as increased negative affect, decreased positive affect (Commodari & La Rosa, 2020; Rogers et al., 2021), perceived loneliness, and boredom (Bösselmann et al., 2021). International review studies also revealed high levels of stress, anxiety and depression among adolescents (Fegert et al., 2020; Guessoum et al., 2020; Jones et al., 2021), attesting that these levels were higher than pre-pandemic trajectories would have predicted (De France et al., 2022).

Alongside this alarming evidence, adolescents were also shown to proactively adjust to restrictions through positive coping skills (Fegert et al., 2020; Jones et al., 2021). Particularly, they were able to quickly reestablish contacts with their social networks through digital technologies (Buzzi et al., 2020). During home confinement, besides experiencing limited autonomy, anguish and loss, they reported positive experiences associated with the discovery of one self, rediscovery of the family, and a deeper bond with friends (Commodari & La Rosa, 2020; Fioretti et al., 2020). Moreover, they engaged in home-based activities such as physical exercise, with beneficial effects on their levels of boredom, stress and fear of COVID-19 (Bösselmann et al., 2021; Lee, 2021; Salzano et al., 2021).

As the pandemic continues to rage and evolve around the world, longitudinal studies are beginning to report further increases in emotional reactivity and mental health problems among adolescents as well as decreases in vigor and life satisfaction (Green et al., 2021; Magson et al., 2021). Prompt identification of personal and social factors that may positively contribute to adolescents' adjustment over time is thus needed to counterbalance the exposure to affective disorders, and to help teens successfully navigate this difficult period.

Optimal Experience and Positive Development

Several studies have shown that individuals' well-being is tightly connected to the quality of experience associated with daily activities and contexts (for a review, Delle Fave et al., 2011; Peifer & Engeser, 2021). In its turn, quality of experience is related to the subjective evaluation of the challenges—or opportunities for action—perceived in one's living environment, and the personal skills in facing them (Abuhamdeh, 2020; Delle Fave et al., 2011). In particular, when individuals perceive a match between high challenges and adequate skills while performing an activity, they are likely to report *flow* or *optimal experience* (Csikszentmihalyi & Csikszentmihalyi, 1988), characterized by deep concentration, involvement, control of the situation, clear goals and feedback, and intrinsic reward (Csikszentmihalyi & Csikszentmihalyi, 1988; Delle Fave et al., 2011; Norworthy et al., 2021; Peifer & Engeser, 2021).

By virtue of these positive characteristics, flow represents a relevant indicator of good psycho-social functioning in adolescence (Asakawa & Csikszentmihalyi, 1998; Bassi et al., 2014; Freire, 2013; Hektner, 2001; Larson, 2000; Mao et al., 2016; Mesurado et al., 2016). Teenagers who experienced flow reported higher life satisfaction and psychological well-being than those who did not (Asakawa & Csikszentmihalyi, 1998; Bassi et al., 2014; Steele & Fullagar, 2009). Positive strong correlations were also observed between flow and positive affect, and negative, though weak, correlations with negative affect (Rogatko, 2009; Tavares et al., 2020). Notably, increases in positive as well as decreases in negative affect were reported immediately after performing flow-inducing activities (Rogatko, 2009). This relation between flow and affect is especially relevant in the developmental stage of adolescence, characterized by more intense emotions than adulthood, wider emotional variability, and use of regulatory strategies with limited effectiveness (Bailen et al., 2019; Bassi et al., 2018; Silvers et al., 2012).

In addition, flow was shown to have far-reaching implications for individual positive development (Isham et al., 2019; Larson, 2000; Worm & Stine-Morrow, 2021): Since it tends to be replicated over time by virtue of its positive and rewarding features (Delle Fave et al., 2011), associated activities—called *flow activities* or *optimal activities*—acquire relevance for the individual as they are preferentially practiced in the long term. This process shapes the individual's life theme, i.e. the interests and goals that are selectively pursued in life (Csikszentmihalyi & Beattie, 1979). In this respect, school-related tasks, sports and hobbies and, to a small extent, interpersonal relations emerged as the main flow activities reported by adolescents across cultures (Bassi & Delle Fave, 2012; Delle Fave & Bassi, 2003; Delle Fave et al., 2011; Freire, 2013; Mesurado, 2010; Schmidt et al., 2014). Studies conducted in the school setting showed that the association of flow with learning contributes to academic performance and achievements (Choe et al., 2015; Hong et al., 2017; Yang et al., 2018), it helps shape long-term goals (Asakawa & Csikszentmihalyi, 1998; Bassi et al., 2007), and it predicts the level of academic career students are planning to pursue (Wong & Csikszentmihalyi, 1991). In the leisure domain, flow activities can evolve into a profession, as in the case of athletes (Jackson & Csikszentmihalyi, 1999; Swann et al., 2017) and musicians (Araújo & Hein, 2019; Delle Fave et al., 2011), but they can provide enjoyment and fulfillment even when circumscribed to free time (Elbe et al., 2010; Freire, 2013). As concerns interpersonal relations, they were primarily found to fulfill affiliation needs and to offer emotional support, fun and excitement, rather than providing opportunities for optimal experience. However, when they did, they were shown to promote emotional growth and the development of social competences (Delle Fave et al., 2011; Magyaródi & Oláh, 2015; Mesurado, 2009; Peifer & Engeser, 2021).

Retrieving optimal experience in one's daily life can become particularly relevant under adverse circumstances like the COVID-19 pandemic. A study conducted among adults in China, as early as February 2020, revealed a significant association between flow and positive emotions during the quarantine (Sweeny et al., 2020). Flow was also shown to play a moderating role between quarantine length and well-being, such that among individuals experiencing high levels of flow little or no association was found between quarantine length and levels of depression, anxiety, and negative emotions. Moreover, an interview study conducted in Germany among four adult women in April 2020 revealed that constant thoughts and worries and lack of social interaction

had contributed to a decrease in flow experiences (Hackmann, 2020); at the same time, one participant mentioned the increase in free time as an opportunity to practice new activities, such as gardening.

Though compelling, these findings were obtained during the initial phase of a long-term condition. The protraction of the health emergency over time may have generated a cleft between pre-pandemic life and the ongoing situation, such that individuals may find it hard to retrieve pre-pandemic flow activities or may be precluded access to them. In this respect, earlier studies conducted among persons with acquired sensory or motor disability have shown that, following a disabling event that causes a breach with one's previous life style, *flow transformation* may occur (Delle Fave, 2010; Delle Fave & Massimini, 2004; Delle Fave et al., 2011). Physical impairment could make activities previously associated with flow unavailable to the individual, who may thus not be able to find flow anymore. It is nevertheless possible that s/he may engaged in modified, accessible versions of the same activity, or that s/he may find new opportunities for commitment and skill development (Reynolds & Prior, 2006; Reynolds et al., 2008; Riva et al., 2006; Soltani et al., 2011). Most participants in these studies successfully managed to identify flow activities after the onset of disability, sometimes in previously unexplored areas, thus proving themselves resilient in adjusting to the new conditions, and able to pursue developmental goals despite biological constraints. The emergence of new meaningful areas of resource investment highlights human flexibility and ability to adjust to adversarial conditions. Exploring these processes among adolescents who experienced life changes related to the COVID-19 pandemic may help devise strategies to prevent or handle potential maladjustment, and to promote well-being.

Current Study

The overall goal of the present study was to investigate adolescents' opportunities for optimal experience in a late stage of the pandemic, still characterized by social and behavioral restrictions, and representing a condition of "chronicity" as compared with the early emergency crisis. The research was conducted in Spring 2021 in Italy, the first country in Europe to be hit by SARS-CoV-2 (Ministero della Salute, 2020). Specifically, data were collected in Milan, the administrative center of Lombardy, namely the region where the pandemic has exacted the heaviest death toll in the country. Depending on the fluctuations of contagion rates, this period was characterized by repeated strengthening and loosening of restrictions, which remarkably disrupted citizens' daily life routines.

The study aims were threefold: (1) to assess the relationship between optimal experience and adolescents' emotional well-being during the pandemic; (2) to explore the phenomenon of flow transformation and its relationship with emotional well-being; and (3) to comparatively describe participants' flow activities before and during the pandemic. For these purposes, adolescents were invited to complete two research instruments: the Flow Questionnaire (Csikszentmihalyi & Csikszentmihalyi, 1988; Delle Fave & Massimini, 1991), assessing the presence vs. absence of optimal experience before and during the pandemic, as well as the flow activities reported by participants; and the Positive Affect Negative Affect Schedule (Watson et al., 1988), measuring current positive and negative affect levels. In line with our primary aim, participants were divided into two groups

characterized by presence vs. absence of optimal experience since the beginning of the pandemic, and levels of positive and negative affect were compared between groups. Based on results from previous studies (Rogatko, 2009; Sweeny et al., 2020), we expected that participants experiencing flow would report higher levels of positive affect and lower levels of negative affect than participants not experiencing it.

To explore flow transformation (Aim 2), participants were further divided into four possible conditions: (1) flow presence before and during the pandemic; (2) flow presence before and flow absence during the pandemic; (3) flow absence before and during the pandemic; and (4) flow absence before and flow presence during the pandemic. Participants' levels of positive and negative affect were then compared, expecting to detect higher positive and lower negative affect in conditions 1 (flow maintenance) and 4 (flow acquisition) as compared to conditions 2 (flow loss) and 3 (constant absence of flow). We further expected to identify no differences in emotional well-being between conditions 2 and 3, hypothesizing that losing flow during the pandemic would be comparable to having never had it at all.

Finally, descriptive analyses were performed on adolescents' flow activities before and during the pandemic (Aim 3). In line with previous studies (Bassi et al., 2014; Bassi & Delle Fave, 2012; Delle Fave & Bassi, 2003; Delle Fave et al., 2011; Freire, 2013; Mesurado, 2010; Schmidt et al., 2014), we expected participants to primarily report flow activities in the learning and leisure domains and, to a small extent, during interpersonal relations. In addition, based on the above-mentioned findings obtained from persons with disabilities and from women interviewed during the early phase of the pandemic, changes between pre-pandemic and current activities were anticipated. Particularly, we expected that, due to restrictions, participants would globally find fewer opportunities for optimal experience during the pandemic. Moreover, we expected that they would report a more limited variety of optimal activities in the domains of sports and hobbies and interpersonal relations, but that they would also identify new flow opportunities, in the attempt to adjust to the new life conditions.

Methods

Participants

A convenient sample of 150 adolescents with a mean age of 17.52 years ($SD=1.01$) took part in this study. They were 61 girls and 89 boys (respectively, 40.7% and 59.3% of the sample), attending high school ($N=125$; 83.3%) or a professional/technical school ($N=25$; 16.7%) in Milan. The majority ($N=84$; 56%) lived with one or both parents and siblings, 63 (42%) lived with one or both parents, two lived with their extended family (including parents, siblings and grand-parents), and one preferred not to provide this information.

Procedure

After approval by the Ethical Committee of the University of Milan (N. 25/21, 18 March 2021), this cross-sectional study took place between May 7 and June 9, 2021. This time frame was chosen as it corresponded to the last period of a critical academic

year characterized by continuous changes in the contagion rates leading to intermittent lockdown periods, consequent school closure and online learning. It was estimated that, between September 2020 and February 2021, secondary school students in Milan had attended classes in presence only 61.9% of the scheduled days (Save the Children, 2021a). After April 27, restriction measures had been weakened, allowing students to go back to class without interruptions until June 8, the last day of the academic year. Though in-presence schooling was highly welcome, headmasters had to face relevant organizational challenges, and teachers were under pressure to complete educational programs.

Inclusion criteria for participants' enrollment were being between 15 and 19 years old, and attending upper secondary schools in Milan. Recruitment was performed in local schools having ongoing contacts with the university. An email presenting the research and related materials was sent to 13 headmasters; nine did not answer, one declined participation, and three accepted the invitation. Based on the inclusion criteria of the study, the school staff identified the potential participants; students willing to participate, as well as parents or guardians for participants aged below 18, provided their informed consent. Participants were subsequently given the link to the Web-based survey containing the study questionnaires. The survey was fully anonymous.

Measures

The online survey included a section with questions about participants' gender, age, type of attended school, and cohabiting persons, followed by two questionnaires investigating the variables of interest. The survey items analyzed in this study are presented in [Appendix 1](#).

Optimal experience before and during the pandemic was assessed with the Flow Questionnaire (FQ; Csikszentmihalyi & Csikszentmihalyi, 1988; Delle Fave & Massimini, 1991), in a version adapted to investigate flow before and after a disruptive event (Delle Fave & Massimini, 2004). Instructions were revised to take the pandemic into account. Participants were asked to read three quotations describing optimal experience, to report on a yes/no format whether they had felt similar experiences since the beginning of the pandemic and, if they had, to list all the associated activities. In case they listed more than one activity, they were asked to select the one providing the most pervasive flow experience, and to rate on 5-point scales the levels of cognitive, affective and motivational variables perceived while performing the activity. Participants were then presented again the quotations describing flow: They were invited to report on a yes/no format whether they had felt similar experiences before the pandemic and, if they had, to list the associated activities. For the purposes of this study, analyses were focused on flow occurrence before and during the pandemic, and the whole range of flow activities reported by the participants.

Positive and negative affect was assessed with the Positive Affect and Negative Affect Schedule (PANAS; Watson et al., 1988). Participants were asked to rate how they had felt over the last week on a checklist of 10 items measuring positive affect (e.g. 'enthusiastic'), and 10 items measuring negative affect (e.g. 'afraid'). Items were on Likert scales ranging from 1 'very slightly or not at all' to 5 'extremely'. Composite mean scores were calculated for positive affect and negative affect by pooling their respective

items together. Internal consistency measured with Cronbach's alpha was deemed good for both positive affect ($\alpha = .88$) and negative affect ($\alpha = .89$).

Data Coding and Analysis

Data quality was inspected prior to analyses. Missing data treatment was not necessary because participants had to complete all relevant fields in order to submit the survey. Data from PANAS were screened for normality through Kolmogorov-Smirnov test and presented no evident violation; furthermore, skewness and kurtosis values were $< \pm 1$. Two dummy variables were created from FQ data, classifying flow occurrence before and during the pandemic (1 = presence; 0 = absence). An additional categorical variable was computed to assess flow transformation based on the cross tabulation of these two dummy variables, thus yielding four conditions: (1) presence of flow before and during the pandemic; (2) presence of flow before the pandemic and absence of flow during the pandemic; (3) absence of flow before and during the pandemic; (4) absence of flow before the pandemic and presence of flow during the pandemic.

In line with the literature on the FQ (Csikszentmihalyi, 1997; Delle Fave et al., 2011), the activities associated with flow were independently coded by two trained researchers using extant manuals, and then grouped into the following broad functional categories: learning, hobbies and sports, interpersonal relations, household, volunteering, media, family, daily activities/accomplishments, and religious and spiritual practices. Interrater agreement amounted to 97.7% and 98.4% for the activities before and during the pandemic, respectively.

Descriptive statistics of the study variables were calculated including percentages for categorical variables, and means and standard deviations for continuous variables. Correlations were calculated using Pearson's, point biserial, or phi coefficient based on the type of variables in the correlation. ANOVAs based on GLM univariate techniques were used to assess the relationship of flow occurrence during the pandemic and flow transformation with participants' positive and negative affect. Demographic variables (i.e. age and gender) which significantly correlated with affect were included in the models as covariates (ANCOVA). Data were checked for violations of AN(C)OVA assumptions. In particular, normality of residuals was tested through Shapiro-Wilk tests and Q-Q plots for each level of the factors under inspection; Levene's test was applied to verify the homogeneity of variances, and presence of outliers was assessed through inspection of standardized residuals. In addition, for ANCOVA models, linearity in the relationship between covariates and the dependent variable was checked for each level of the independent variable; homogeneity of regression slopes in each cell of the design was also inspected by testing the absence of a significant interaction effect of the covariates and the independent variables. To assess the reliability of statistically significant results, observed effect sizes (f index; Cohen, 1988) were compared with threshold values calculated through sensitivity analysis (Faul et al., 2007). Scores of .10, .25, and .40 were interpreted as small, medium, and large effects, respectively (Cohen, 1988). Frequencies and percentages were used to describe participants' flow activities before and during the pandemic.

Results

Flow Occurrence and Affect during the Pandemic

Out of 150 participants, 37 (24.7%) reported having had optimal experience since the start of the pandemic, while 113 (75.3%) did not. On a range from 1 to 5, average ratings of positive and negative affect were 2.76 ($SD=0.80$) and 2.94 ($SD=0.93$), respectively. Correlations among study variables are displayed in Table 1. Flow occurrence was significantly associated with higher positive affect and lower negative affect. Age was significantly correlated with flow occurrence and negative affect, with older participants reporting flow experience in lower percentages as well as more negative affect than younger ones. As concerns gender, girls reported significantly more negative affect than boys.

In line with the primary study aim, a one-way ANOVA was conducted to examine the relationship between flow occurrence and positive affect, and a one-way ANCOVA was performed between flow occurrence and negative affect, with age and gender as covariates. All the AN(C)OVA assumptions described in the Methods section were met. As expected, the model for positive affect was significant ($F(1,148) = 16.25, p < .001$), with a medium-to-large effect size ($f = .33$), higher than the sensitivity threshold ($f = .23; N=150; 1-\beta = .80; \alpha=.05$). Results showed that participants experiencing flow during the pandemic reported higher positive affect ($M=3.20, SD=0.81$) than those who did not ($M=2.62, SD=0.74$). By contrast, adjusting for age and gender, no significant difference was detected for negative affect between participants reporting ($M=2.64, SD=0.91$) and not reporting flow ($M=3.04, SD=0.92$).

Flow Transformation and Affect

Seventy-three students (48.7%) reported having experienced flow before the pandemic; 43.8% of them also reported flow occurrence during the pandemic (condition 1), whereas 56.2% reported no longer having it (condition 2). Out of the 77 students (51.3%) not reporting flow in the pre-pandemic period, 93.5% still did not experience it during the pandemic (condition 3), while only 5 (6.5%) reported acquiring it (condition 4). Participants' positive and negative affect scores across these four conditions are presented in Table 2.

Table 1. Correlations among Study Variables ($N_{\text{participants}} = 150$).

	1	2	3	4	5
1. Age	—	.12 ^a	-.15 ^b	.27 ^{**b}	-.31 ^{***a}
2. Gender		—	-.07 ^a	.28 ^{**a}	-.10 ^c
3. Positive affect			—	-.28 ^{***b}	.31 ^{***a}
4. Negative affect				—	-.19 ^{*a}
5. Flow occurrence during the pandemic					—

^a $p < .05$;

^{**} $p < .01$;

^{***} $p < .001$.

Gender: 0 = male, 1 = female; Flow occurrence during the pandemic: 1 = presence, 0 = absence.

^aPoint biserial coefficient (r_{pb}).

^bPearson's coefficient (r).

^cPhi coefficient (ϕ).

Table 2. Participants' Positive and Negative Affect Based on Flow Occurrence before and during the Pandemic ($N_{\text{participants}} = 150$).

Flow transformation conditions	Frequency	Positive affect		Negative affect	
	N (%)	M	SD	M	SD
1. Flow presence before and during the pandemic	32 (21.3)	3.13	0.76	2.64	0.88
2. Flow presence before and flow absence during the pandemic	41 (27.3)	2.56	0.78	3.00	0.76
3. Flow absence before and during the pandemic	72 (48.0)	2.65	0.73	3.06	1.00
4. Flow absence before and flow presence during the pandemic	5 (3.3)	3.60	1.10	2.64	1.19

To explore the relationship between flow transformation and adolescents' emotional well-being (Aim 2), one-way AN(C)OVAs were performed. As suggested by [Tabachnick and Fidell \(2007\)](#), minimum cell counts for these analyses should be ≥ 20 . Due to the small number of participants in condition 4 ($N=5$), analyses were conducted on the other three conditions only ($N=145$), in order to ensure robustness of results¹.

The ANOVA model for positive affect met all the statistical assumptions and it was significant ($F(2,142) = 6.13, p = .003$), with a medium effect size ($f = .29$), higher than the sensitivity threshold ($f = .23; N=145; 1-\beta = .80; \alpha = .05$). As expected, post-hoc comparisons using the Scheffe test indicated that participants who experienced flow both before and during the pandemic (condition 1) reported higher positive affect than participants who never experienced flow (condition 3; $p = .011$) or participants who had flow before but not during the pandemic (condition 2; $p = .006$). No significant difference in positive affect was instead observed between participants in conditions 2 and 3.

As for negative affect, a violation in the homogeneity of regression slopes assumption was observed for the ANCOVA model with age and gender as covariates and flow transformation as predictor variable; specifically, the interaction between gender and flow transformation was significant ($F(2,136) = 6.127; p = .016$). In order to account for this significant effect, the interaction term was included in the final ANCOVA model; no assumption was violated in the re-specified model. Taking into account, age, gender, and the interaction between gender and flow transformation, no significant contribution of flow transformation to negative affect scores was observed.

Optimal Activities before and during the Pandemic

To meet the third study aim, participants' overall distribution of optimal activities before and during the pandemic was calculated. Findings are displayed in [Table 3](#). Overall, before the pandemic, flow was primarily associated with learning tasks, including studying in general, studying specific subjects, and performing school activities. The category hobbies and sports was next in frequency: It comprised sport in general or specific activities like playing soccer, volleyball, swimming, physical exercise and workout; hobbies in general or specific ones (e.g. playing music, games, or videogames); and outdoors activities like going out and riding the bike. Interpersonal relations ranked third in frequency: They referred to activities like seeing or going out with friends, other people, or one's partner, engaging in sexual activity, and interacting with one's pet. To a smaller extent, participants reported the use of media (watching TV series, listening to music, reading), daily activities/accomplishments (most daily situations, proving oneself independent, completing a complex activity), family (meeting

Table 3. Distribution of Optimal Activities before and during the Pandemic.

Activity domains	Before <i>N</i> (%)	During <i>N</i> (%)
Learning	49 (38.0)	24 (38.7)
Hobbies and sports	41 (31.8)	26 (41.9)
Interpersonal relations	16 (12.4)	2 (3.2)
Media	8 (6.2)	5 (8.1)
Daily activities/accomplishments	7 (5.4)	1 (1.6)
Family	3 (2.3)	2 (3.2)
Household	3 (2.3)	–
Volunteering	1 (0.8)	–
Religious and spiritual practices	1 (0.8)	2 (3.3)
<i>N</i> _{answers}	129	62
Range _{answers}	1-4	1-4
<i>N</i> _{participants}	73	37
Average $N_{answers}$	1.77	1.68

relatives, staying with family), household (handiworks, baking cakes), volunteering (helping people in need), and religious and spiritual practices (praying).

During the pandemic, flow was primarily associated with hobbies and sports, including sport in general or specific activities such as playing soccer, boxing, swimming, physical exercise and workout; and hobbies in general, or specific ones like playing music, games or videogames. Learning was next in frequency, including studying in general or specific subjects, as well as school activities. To a smaller extent, participants reported the use of media (watching TV series, reading, and music), interpersonal relations (interacting with one's pet, sexual activity), family (meeting relatives, staying with family), religious and spiritual practices (meditation and yoga), and daily activities/accomplishments (personal activities).

Discussion

The present study examined adolescents' opportunities for optimal experience over one year after the COVID-19 pandemic outbreak, focusing on the relationship of flow occurrence and flow transformation with emotional well-being, and on the optimal activities reported before and during the pandemic. While studies involving adolescents in the early stages of the pandemic detected both negative and positive experiences, as well as mobilization of personal and social resources (Buzzi et al., 2020; Commodari & La Rosa, 2020; Fegert et al., 2020; Fioretti et al., 2020; Jones et al., 2021; Salzano et al., 2021), more recent studies have hinted to a decline in adolescents' ability to endure and manage pandemic-related adversities over time (Green et al., 2021; Magson et al., 2021).

Results from our study were consistent with this negative trend. Only one fourth of the participants reported optimal experience since the beginning of the pandemic: This is an alarming result when compared with the percentage of participants reporting flow in pre-pandemic times (48.7%), and with the percentage of Italian adolescents reporting flow in previous studies (66.4% and 68.9%; Bassi et al., 2014; Delle Fave et al., 2011). In addition, over half of the participants who had experienced flow before the pandemic failed to report it again; and only 6.5% of those who did not identify flow in pre-pandemic times managed to find it afterwards. These figures underscore the potential negative effect of the pandemic persistence over time.

Flow Occurrence and Well-Being Promotion

In line with the primary study aim, we first analyzed the relationship between flow occurrence and adolescents' emotional well-being during the pandemic. Findings partially supported our hypotheses, highlighting that students experiencing flow reported higher positive affect than students not experiencing it; this result was consistent with evidence from pre-pandemic studies among adolescents (Tavares et al., 2020), and among adults during the pandemic (Sweeny et al., 2020). No significant group differences instead emerged in negative affect levels, after accounting for age and gender; this finding is in contrast with a previous study identifying the moderating role of flow between quarantine length and negative affect (Sweeny et al., 2020). This research was however conducted among adult participants, so our divergent results may be related to the lower ability of our younger participants to regulate negative affect (Bassi et al., 2018; Silk, et al., 2003). Moreover, the research was conducted during the first stage of the pandemic (Sweeny et al., 2020), while having flow may not have been sufficient to counterbalance the negative affect arising from the persisting restrictions that characterized the daily life of adolescents in our study. Future studies are thus needed to further explore personal and social resources that may help teenagers manage negative affect levels under similar circumstances. Nonetheless, the association of flow with positive affect brings forward the opportunity for finding emotional respite: Under adverse conditions, the upregulation of positive emotions has emerged as a useful response in the face of coexisting negative emotions and experiences, such as those following the terrorist attacks of September 11th, 2001 (Fredrickson et al., 2003). Conversely, decreases in positive affect were found to predict symptoms of mental illness, especially among adolescents (Olinio et al., 2011). In line with experimental studies showing that flow was predictive of positive affect and not vice versa (Rankin et al., 2019; Rogatko, 2009), findings from the present investigation corroborate the promising role of optimal experience in promoting adolescents' emotional well-being and in potentially protecting from mental illness.

Flow and Affect under Changing Life Circumstances

To delve deeper into adolescents' optimal experience, we next examined the phenomenon of flow transformation and its relationship with emotional well-being. Flow transformation was operationalized into four possible conditions: global flow preservation, global flow absence, loss of flow during the pandemic, and flow acquisition during the pandemic. Due to the small number of participants falling into the latter condition, analyses were conducted on the other three groups. Overall, flow transformation was significantly associated with positive affect and, after accounting for age, gender and the interaction between flow transformation and gender, it was not associated with negative affect. These findings substantially confirmed the previously discussed association between flow occurrence and higher levels of positive affect.

Novel information further emerged from the post-hoc comparisons of positive affect across conditions. Notably, as expected, higher levels of positive affect were detected among participants who maintained flow as compared to those who never had it, and also those who lost it. In addition, similar levels of positive affect were reported by

adolescents who never had flow and those who lost it, suggesting that the emotional implications of losing flow during the pandemic were comparable to those of having never experienced flow. In other words, what seemed to make a difference in supporting positive affect among our participants was the retrieval of optimal experience under current living conditions, independently of past experiences. This observation is corroborated by the similarity in positive affect scores reported by the adolescents who maintained flow during the pandemic and the few ones who acquired it. Since no statistical analysis including this latter group could be performed, future studies are needed to further explore the relationship between adolescents' affect states and flow acquisition during the pandemic.

Finding Meaningful Challenges in Adverse Times

Finally, descriptive analyses were conducted to investigate participants' optimal activities before and during the pandemic. In line with previous international studies involving adolescents (Bassi et al., 2014; Bassi & Delle Fave, 2012; Delle Fave & Bassi, 2003; Delle Fave et al., 2011; Freire, 2013; Mesurado, 2010; Schmidt et al., 2014), learning, hobbies and sports and, to a small extent, interpersonal relations emerged as relevant opportunities for optimal experience at both times. Different percentage distributions and, to some degree, different types of flow activities were however reported before and during the pandemic.

The learning domain ranked first in frequency before and second during the pandemic, primarily comprising, at both times, studying on one's own, and also school activities. This latter result is particularly interesting, as school activities were mostly conducted online since the pandemic outbreak (Save the Children, 2021a), and several studies have documented pupils' higher concentration problems, lower academic performance, and worsened mood and ability to socialize during remote schooling (Save the Children, 2021b). As our participants generically quoted "school activities" in their answers, it was not possible to tell whether they referred to online or in-presence classes. Lack of specification may imply that type of didactic mode was not relevant for flow onset, and that school activities by themselves catalyzed adolescents' attention and resource investment. More studies are needed to clarify this issue, as use of distance learning is likely to further spread in the future, along with the implementation of innovative educational programs integrating diverse teaching and learning modalities.

Hobbies and sports were the second most frequent flow domain before the pandemic and, surprisingly, the most frequent one during it, despite movement restrictions and physical distancing. This finding was however consistent with evidence obtained from adolescents during the initial stages of the pandemic, documenting home-based practice of physical exercise and its beneficial effects on mood levels (Bösselmann et al., 2021; Commodari & La Rosa, 2020; Lee, 2021). Moreover, pandemic-related limitations did not substantially restrict the variety of hobbies and sports reported by the participants. Most of the activities reported in this domain before the pandemic—such as swimming, playing music, playing videogames, and working out—were mentioned also during the pandemic. Other activities were instead specifically suited to life circumstances: Only before the pandemic did participants cite team sports like volleyball, and outdoors activities like going out and riding the bike; and only during the pandemic did they

report boxing and drawing. These findings suggest that adolescents proved to be able to profitably invest the higher amount of free time available to them during the pandemic in previously practiced hobbies and sports, as well as in new—though few—flow opportunities.

As expected, the area of interpersonal relations was far less relevant than learning and leisure in providing participants with opportunities for optimal experience (Delle Fave et al., 2011): It ranked third before, and it was barely reported during the pandemic. While at both times participants mentioned interacting with one's pet and sexual activity, before the pandemic they also reported social gatherings like seeing and going out with other people. These findings suggest that meeting in presence may represent a crucial ingredient for finding flow in social occasions, a condition that could not be adequately replaced by the online interactions adolescents could access during the pandemic, even through a variety of social media (Buzzi et al., 2020).

Additional flow domains reported to a smaller extent both before and during the pandemic were the use of media, family, daily activities and accomplishments, and religious and spiritual practices, whereas household and volunteering were only reported before the pandemic. Overall, these findings further attest to the global loss in the variety of flow activities retrieved during the pandemic, and also to participants' limited ability to explore new activity domains. In analogy with an acquired disability (Delle Fave, 2010; Delle Fave & Massimini, 2004; Delle Fave et al., 2011), the pandemic has suddenly and pervasively disrupted adolescents' daily routines and habits. However, unlike disability for which well-defined pre- and a post-injury conditions can be identified, the pandemic has not yet subsided, causing enduring uncertainty and need for constant adaptation. This dynamic situation, coupled with the sensitive developmental period adolescents are going through, may contribute to their difficulty in maintaining or finding flow in their daily life. Guidance is thus recommended to help teens identify relevant opportunities for optimal experience and navigate these difficult times.

Limitations

The present study has several limitations that should be taken into account when interpreting results. First, its cross-sectional design did not allow us to draw causal conclusions. Particularly, even if previous research has shown that flow was predictive of emotional well-being and not vice versa (Rankin et al., 2019; Rogatko, 2009), bi-directional relations could not be ruled out, and should be further investigated through longitudinal studies. Moreover, in analogy with another flow study carried out during the pandemic (Hackmann, 2020), flow occurrence before the pandemic was measured retrospectively. The number of participants reporting or not reporting pre-pandemic flow experiences may thus be partially influenced by the recall bias. However, given the uniqueness of the situation, present findings provide initial empirical evidence to be compared with possible future longitudinal studies.

Concerning the sample, all participants attended upper secondary school in a big Italian city; these specific features preclude generalization of findings to adolescents who do not go to school, live in suburban and rural areas, or in other countries. Further studies are needed to investigate optimal experience among adolescents coming from different geographic areas and socio-cultural contexts. Nonetheless, considering

that the onset of the pandemic in Italy, and particularly in Milan, was exceptionally violent and long lasting, present findings can offer timely information on the effects of prolonged restrictions. Furthermore, even if sensitivity analysis supported the reliability of significant results, the small number of participants acquiring flow during the pandemic did not allow us to delve deeper into this flow transformation condition.

Finally, a potential self-selection bias in school participation should be acknowledged, as only three out of 13 school headmasters accepted our invitation. Personal communication with teachers revealed that this low acceptance rate may primarily be due to the critical period in which the study was conducted, characterized by the reactivation of in-presence classes in the respect of prevention rules, combined with pressure to conclude educational programs. Teachers also mentioned that they were receiving a large amount of survey invitations, and they did not want to overburden their students.

Knowledge Acquisition and Practical Implications

The study limitations are at least partially counterbalanced by the unique kind of information gathered from adolescents exposed to extraordinary circumstances. Particularly, our investigation underscored the relationship between flow and teens' emotional well-being; it highlighted the importance of having flow under current circumstances, irrespective of past experiences, but also adolescents' present difficulty in maintaining or finding flow. The pandemic thus seems to have limited opportunities for both enjoying short-term positive and rewarding experiences and for constructing long-term life goals.

Prompt intervention is needed to help teens ride the pandemic waves, as COVID-19 is likely to affect their lives for the years to come. Programs should be developed to encourage adolescents' openness to experience as a crucial aspect facilitating flow retrieval (Bassi et al., 2014; Ullen, et al., 2012). Creativity and curiosity could help them develop a constructive attitude toward life and seize opportunities for enjoyment and personal growth in available domains. Most importantly, families, schools and society as a whole share the responsibility to act as facilitators in this process, promoting the necessary contextual conditions in which adolescents can identify challenging and meaningful opportunities for self-expression and for building crucial skills and competences. Retrieving and cultivating flow activities could help adolescents restore continuity between past and present, and to set the basis for their future.

Note

1. The dataset for the analysis of flow transformation included 145 participants (M age= 17.52 years; $SD=1.03$; range= 15-19), 59 girls and 86 boys (respectively, 40.7% and 59.3%) who attended high school ($N=121$; 83.4%), or professional/technical schools ($N=24$; 16.7%). The participants in condition 4 excluded from analysis were 2 girls (40%) and 3 boys (60%) with a mean age of 17.60 years ($SD=0.55$); four (80%) attended high school and one (20%) a professional/technical school. No significant differences emerged between this group and the other participants pooled together concerning gender, age, type of school, and negative affect levels ($N=145$, $M=2.95$, $SD=0.92$), whereas students in condition 4 scored higher on positive affect ($N=145$, $M=2.73$, $SD=0.77$; $F(1,148)=5.92$, $p=.016$).

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